WR7500-UM-251

LINEARCORDER mini

WR7500

SERVICE MANUAL
AND PARTS LIST

GRAPHTEC CORPORATION
TOKYO, JAPAN

Table of Contents

		Page
1.	NAMES AND FUNCTIONS OF PARTS	1
1.1	Front View	1
1.2	Side View	2
1.3	Top View	2
1.4	Chart Driver and Mother Boards	3
2.	DISASSEMBLY AND ASSEMBLY	4
2.1	Top Cover Removal	4
2.2	Pen Motor Removal	5
2.3	Pen Replacement	5
3.	ADJUSTMENT	6
3.1	Pen Motor Mounting and Perpendicularity Adjustment	6
3.2	Stabilizer Adjustment	7
3.3	Servo Amplifier Adjustment	8
3.4	Heat Control Circuit Adjustment	10
3.5	Preamplifier Adjustment	12
3.6	Chart Driver Adjustment	14
4.	MECHANISM CONFIGURATION	4-1
4.1	Mainframe	4-1
4.2	Chart Drive Mechanism	4-5

Page

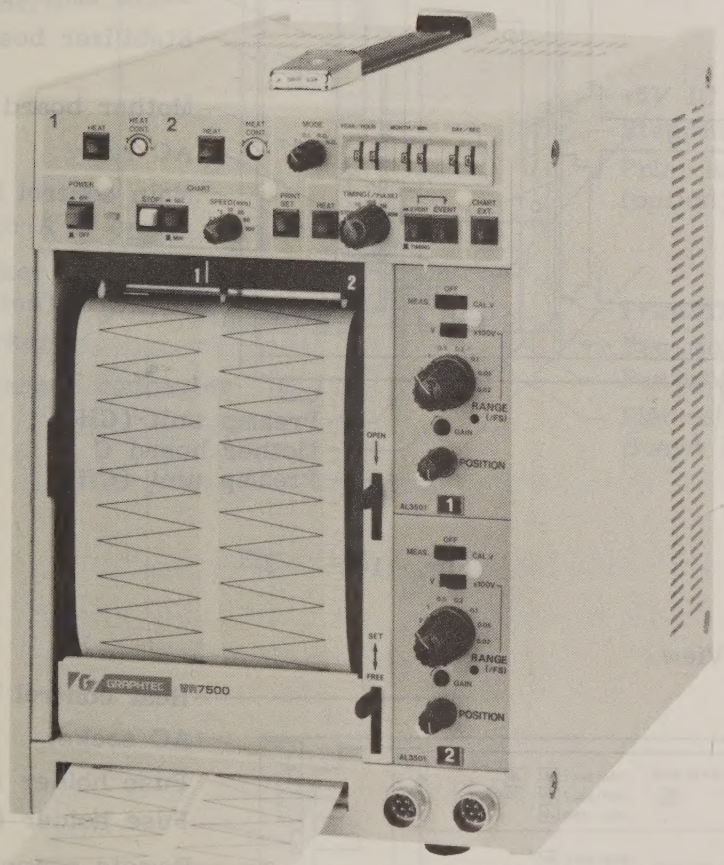
5. CIRCUIT DIAGRAMS 5-1
5.1 Wiring Diagram/Mother Board 5-1
5.2 Power Supply/Converter/Control Unit 5-5
5.3 Chart Driver 5-11
5.4 Printer Controller 5-19
5.5 Heat Control Unit 5-23
5.6 Servo Amplifier/Stabilizer 5-29
5.7 Preamplifier (AL3501) 5-37
5.8 Preamplifier (AH3501) 5-41

6. SPECIFICATIONS 6-1
6.1 Mainframe Specifications 6-1
6.2 Preamplifier Specifications 6-2
6.3 Options 6-3
6.4 Accessories 6-4
6.5 Supplies 6-4

7. OUTER DIMENSIONS 7-1

1. NAMES AND FUNCTIONS OF PARTS

1.1 Front View



1.2 Side View

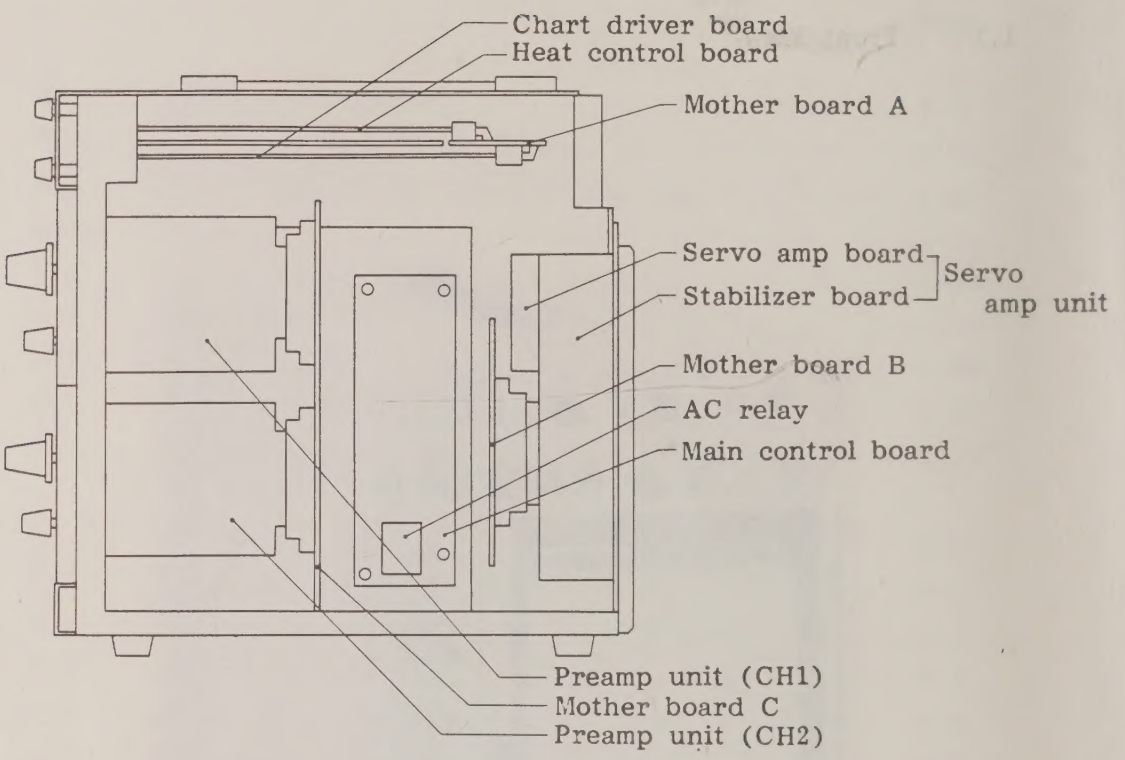


Fig. 1-1

1.3 Top View

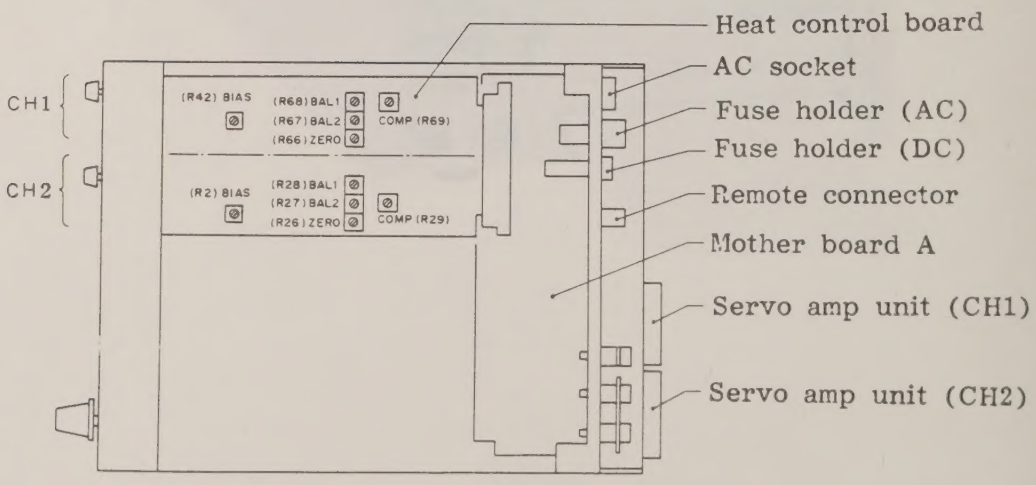


Fig. 1-2

1.4 Chart Driver and Mother Boards

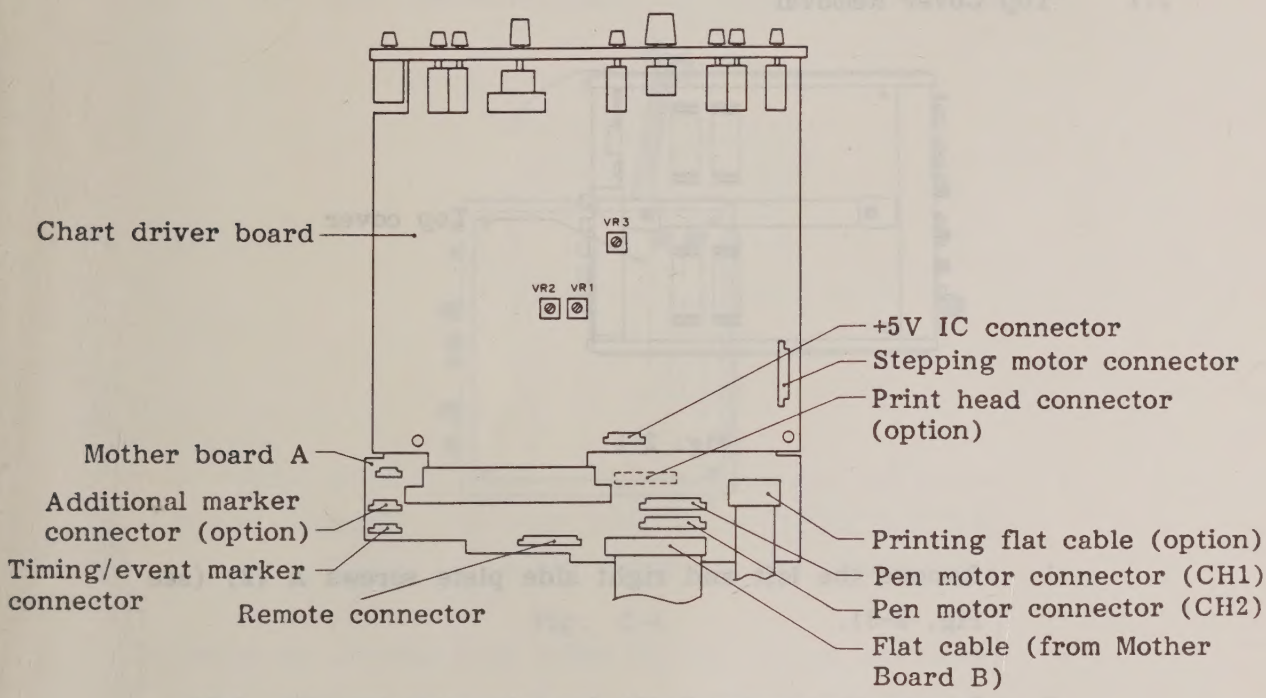


Fig. 1-3

2. DISASSEMBLY AND ASSEMBLY

2.1 Top Cover Removal

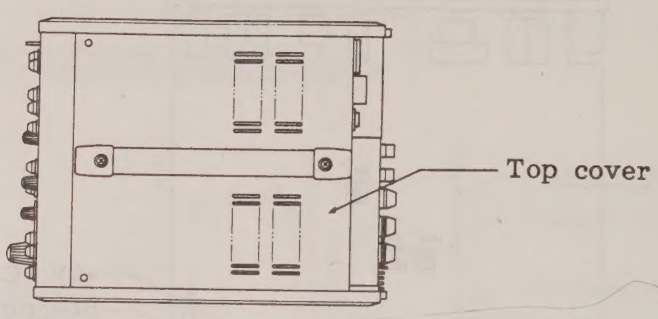


Fig. 2-1

1 Remove the left and right side plate screws A (2) (see Fig. 2-3).

2 Remove the screws B (2) from the rear (see Fig. 2-2).

3 Remove the top cover.

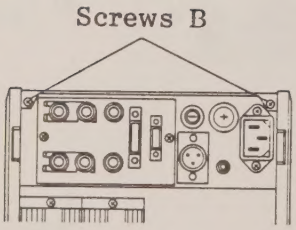


Fig. 2-2

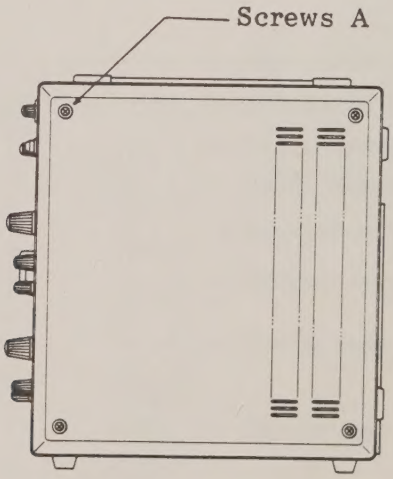


Fig. 2-3

2.2 Pen Motor Removal

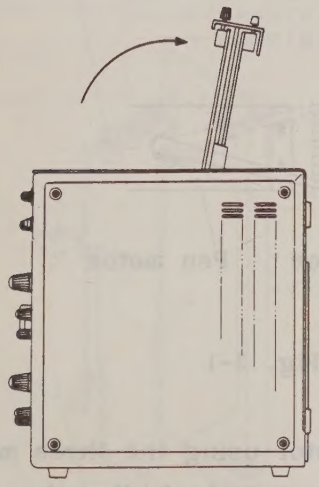


Fig. 2-4

1 Remove the top cover as described in Section 2.1.

2 Rotate the operation panel and chart driver board upward about their supporting post so that the board is upright, as shown in Fig. 2-4.

3 The pen motor is now visible from the top. Remove the pen motor mounting screws and then the pen motor itself.

2.3 Pen Replacement

1 Stand the chart driver board upright, as shown in Fig. 2-4.

2 Use a 2mm set wrench to replace the pen.

3. ADJUSTMENT

3.1 Pen Motor Mounting and Pen Perpendicularity Adjustment

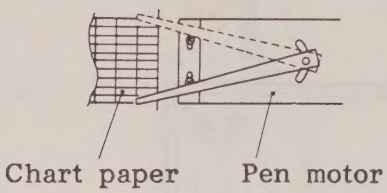


Fig. 3-1

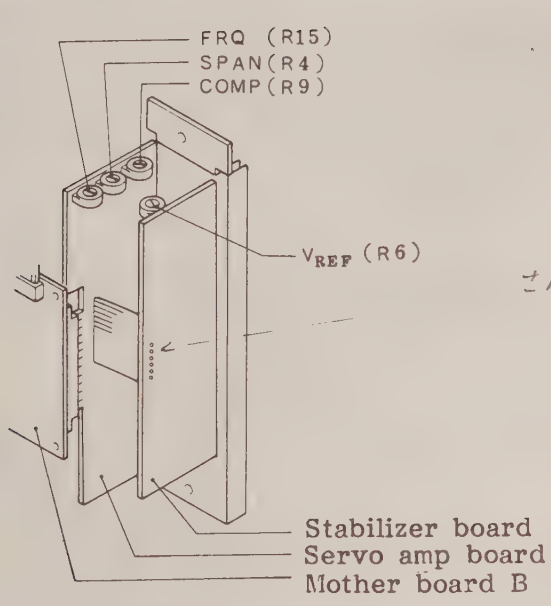
1 Mount the pen motor using the three mounting screws so that the chart paper feed direction reference line is parallel with the side of the motor.

2 Mount the pen to the pen motor shaft using a set screw.

3 Move the pen left and right manually to check its perpendicularity with respect to the chart paper lines. If it is not perpendicular, loosen the set screw and adjust the pen mounting position (see Fig. 3-1). When making this adjustment, check the effective stroke as well.

4 The pen force for both S and W types should be 20±3g.

3.2 Stabilizer Adjustment



±15V pins 1+2

Fig. 3-2

1 Remove the driver (refer to Section 2.1 for the method of removing the top cover).

2 Remove the right side plate (as seen from the front).

3 Stand the chart driver board upright as shown in Fig. 2-4.

4 Adjust the +15V using the R6 trimmer on the stabilizer board.

The +15V and -15V are measured at pin B6 and B5, respectively, of the card edge connector J2 with respect to the TB2 (0V) terminal on the stabilizer board. Each of these voltages should be within ±0.25%.

3.3 Servo Amplifier Adjustment

There are four trimmers used to perform servo system adjustments. Of these, one is the pen ZERO adjustment which is located on the Heat Control board (Fig. 3-3). The other servo amplifier trimmer locations are shown in Fig. 3-2.

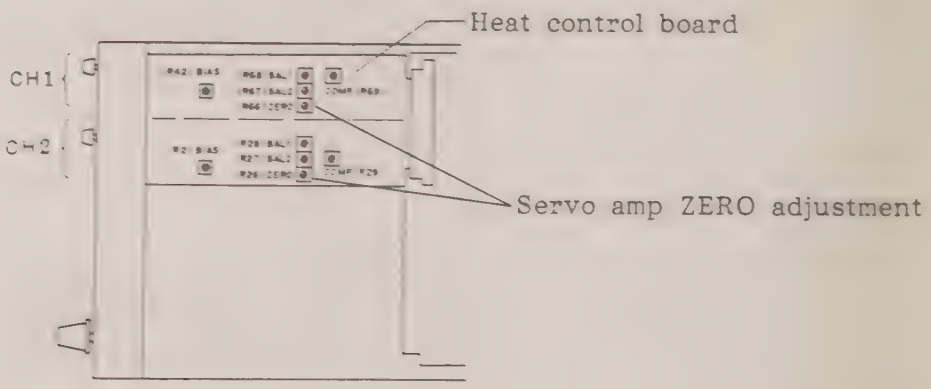
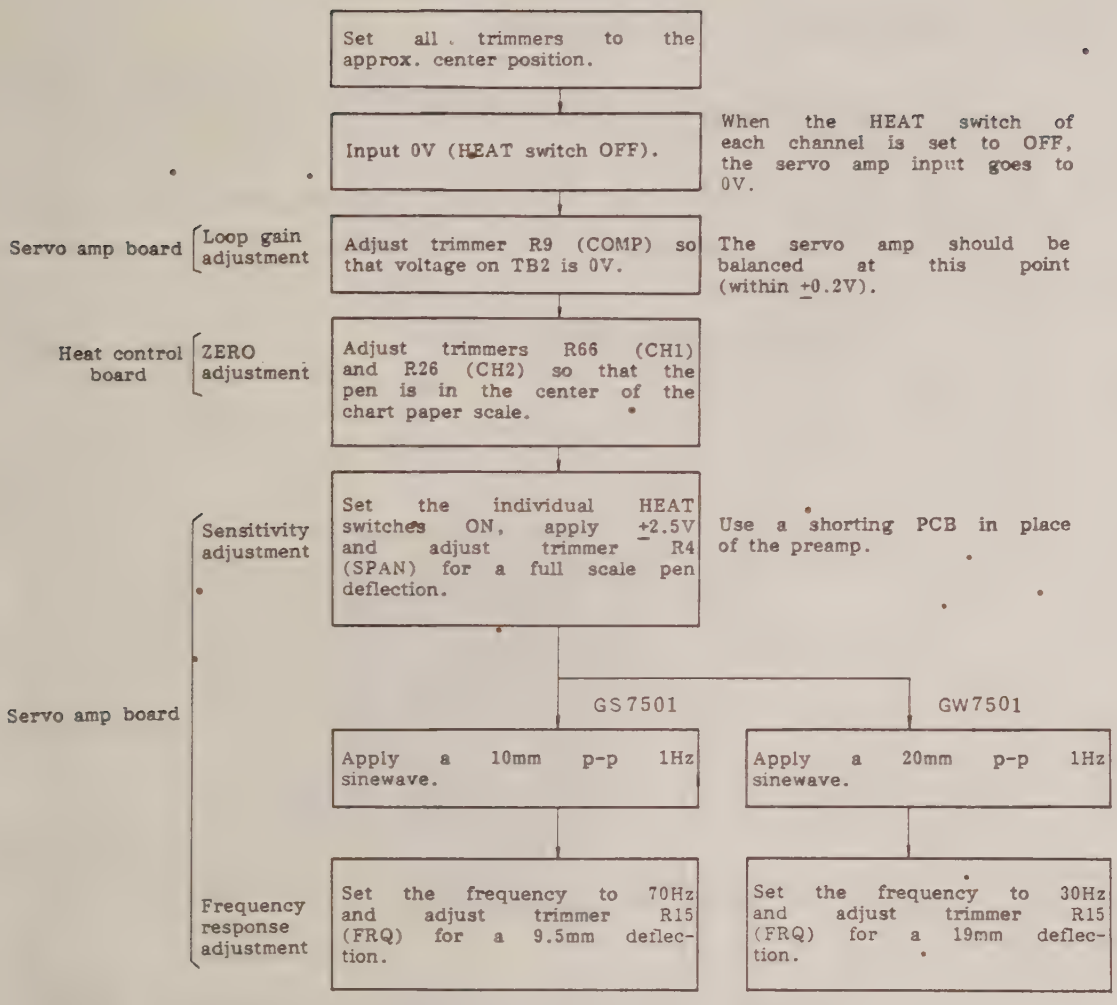


Fig. 3-3

The servo amplifier adjustment procedure is given in flowchart form on the following page.


Set all trimmers to the approx. center position.
Input 0V (HEAT switch OFF).
When the HEAT switch of each channel is set to OFF, the servo amp input goes to 0V.
Servo amp board
Loop gain adjustment
Adjust trimmer R9 (COMP) so that voltage on TB2 is 0V.
The servo amp should be balanced at this point (within ±0.2V).
Heat control board
ZERO adjustment
Adjust trimmers R66 (CH1) and R26 (CH2) so that the pen is in the center of the chart paper scale.
Servo amp board
Sensitivity adjustment
Set the individual HEAT switches ON, apply ±2.5V and adjust trimmer R4 (SPAN) for a full scale pen deflection.
Use a shorting PCB in place of the preamp.
GS7501
GW7501
Apply a 10mm p-p 1Hz sinewave.
Apply a 20mm p-p 1Hz sinewave.
Frequency response adjustment
Set the frequency to 70Hz and adjust trimmer R15 (FRQ) for a 9.5mm deflection.
Set the frequency to 30Hz and adjust trimmer R15 (FRQ) for a 19mm deflection.

3.4 Heat Control Circuit Adjustment

- o All voltages are specified with respect to TB1 (ground).
- o When making this adjustment, remove the thermal pen (s) and replace with a 110Ω resistor.
- o For the GW7501, CH1 is used.

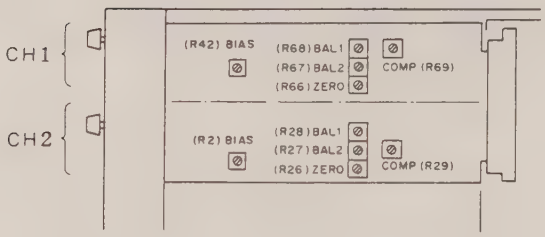


Fig. 3-4

The heat control circuit adjustment procedure is given in flowchart form on the following page.

(1) Offset Adjustment

Set individual HEAT switches to OFF and EXT SW to ON (push).

CH1

Adjust trimmer R68 (BAL1) for 0V at TB7.

Adjust trimmer R67 (BAL2) for 0V at TB8.

CH2

Adjust trimmer R28 (BAL1) for 0V at TB2.

Adjust trimmer R27 (BAL2) for 0V at TB3.

(2) Gain Adjustment

HEAT SW:ON

+250 mV

0 V

With a 1.25Hz 40mm triangle wave deflecting the pen, adjust trimmer R69 (COMP) for approx. 250mV at TB7.

With a 1.25Hz 40mm triangle wave deflecting the pen, adjust trimmer R29 (COMP) for approx. 250mV at TB2.

Short TB9 to TB1 (GND).

Short TB4 to TB1 (GND).

V_0: Voltage between the positive terminal of 110Ω resistor and GND

+4.2 V

0 V

With a 1.25Hz 40mm triangle wave deflecting the pen, set the heat control potentiometer so that V0 is approx. 4.2V.

CH1

CH2

HEAT SW:ON
EXT SW:ON

Remove the short between TB9 and TB1 (GND). The pen will stop.

Remove the short between TB4 and TB1 (GND). The pen will stop.

(3) Bias Adjustment

+3.8 V

0 V

Adjust trimmer R42 (BIAS) for a V0 of approx. 3.8V.

Adjust trimmer R2 (BIAS) for a V0 of approx. 3.8V.

(4) Limiter Check

With a 10Hz, 40mm triangle wave deflecting the pen, the following conditions have been established:
Speed ≤ 10mm/s: V0 ≅ 8V
Speed ≥ 25mm/s: V0 ≅ 13V

(5) Recording

Replace the thermal pen with a 110Ω resistor and adjust the heat control potentiometer.

3.5 Preamplifier Adjustment

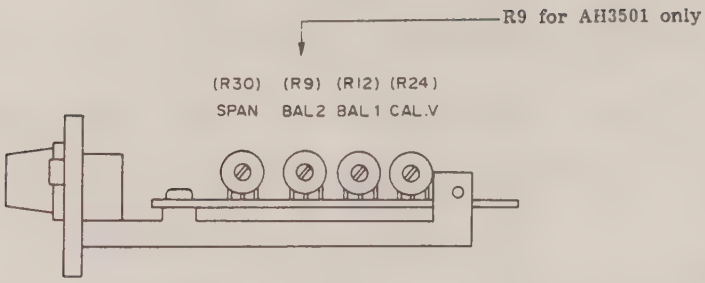


Fig. 3-5

(1) Balance Adjustment

Set all trimmers to the approx. center position.

Set the input switch to OFF and the multiply switch to V(mV).

( ) items are for the AH3501.

BAL.1 — Adjust trimmer R12 (BAL. 1) so that the pen position at maximum sensitivity is the same as that for minimum sensitivity.

Set the input switch to MEAS (input open).

For AH3501 BAL.2 — Adjust trimmer R9 (BAL. 2) so that the pen position in the MEAS mode is the same as the OFF setting.

(2) Gain Adjustment

Set the range to 2V/FS (2000mV/FS) and the pen to the center (reference line).

( ) values are for the AH3501.

	GS7501	GW7501
GAIN (Front panel)	Adjust the GAIN potentiometer so that applying 1V causes 20mm deflection.	Adjust the GAIN potentiometer so that applying 1V causes 40mm deflection.

(3) Calibration

Voltage adjustment

GS7501	GW7501
With the pen at the center (reference line), adjust trimmer R24 for 20mm deflection when the input switch is set to CAL.	With the pen at the center (reference line), adjust trimmer R24 for 40mm deflection when the input switch is set to CAL.

Notes

1. BAL. 1 should be adjusted if changing the range causes the pen tip to move more than 0.3mm.

2. BAL. 2 should be adjusted if changing the multiplier switch causes the pen tip to move more than 0.3mm.

3.6 Chart Driver Adjustment

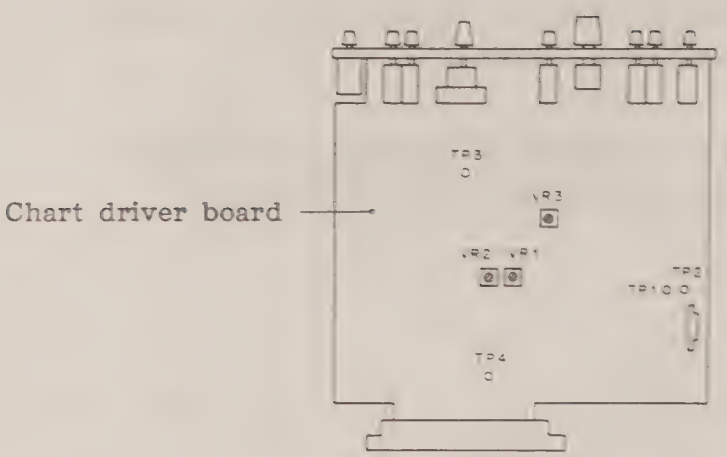


Fig. 3-6

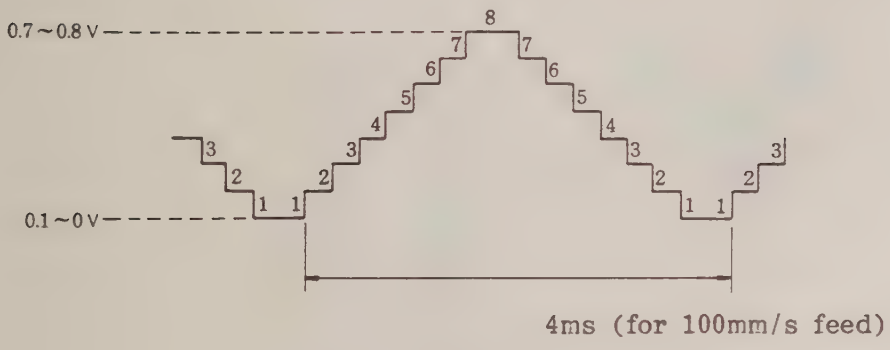
o All voltages are specified with respect to TP4 (ground).

3.6.1 Feed

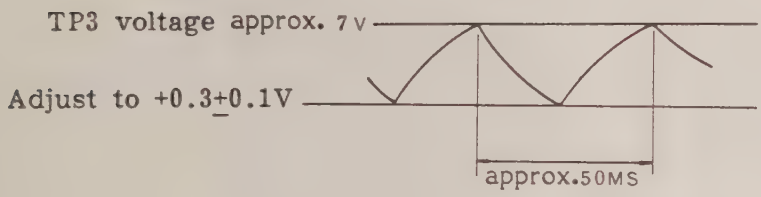
1 Check of Oscillation Frequency

	IC16 pin 10		Card edge pin B7	
Range	f(Hz)	T(ms)	f(Hz)	T(ms)
100mm/s	4000	0.25	250	4
50	2000	0.5	125	8
25	1000	1	62.5	16
10	400	2.5	25	40
5	200	5	12.5	80
2.5	100	10	6.25	160
1	40	25	2.5	400
100mm/min	66.66	15	4.166	240

2 TP1 and TP2 Waveforms (These Waveforms Should Be in Mutually Opposite Phase)



3 VR3 Adjustment



3.6.2 Marker Voltage

1 VR2 Adjustment

Adjust VR2 so that, with the chart drive stopped, the voltage at card edge connector pin B10 is 0V.

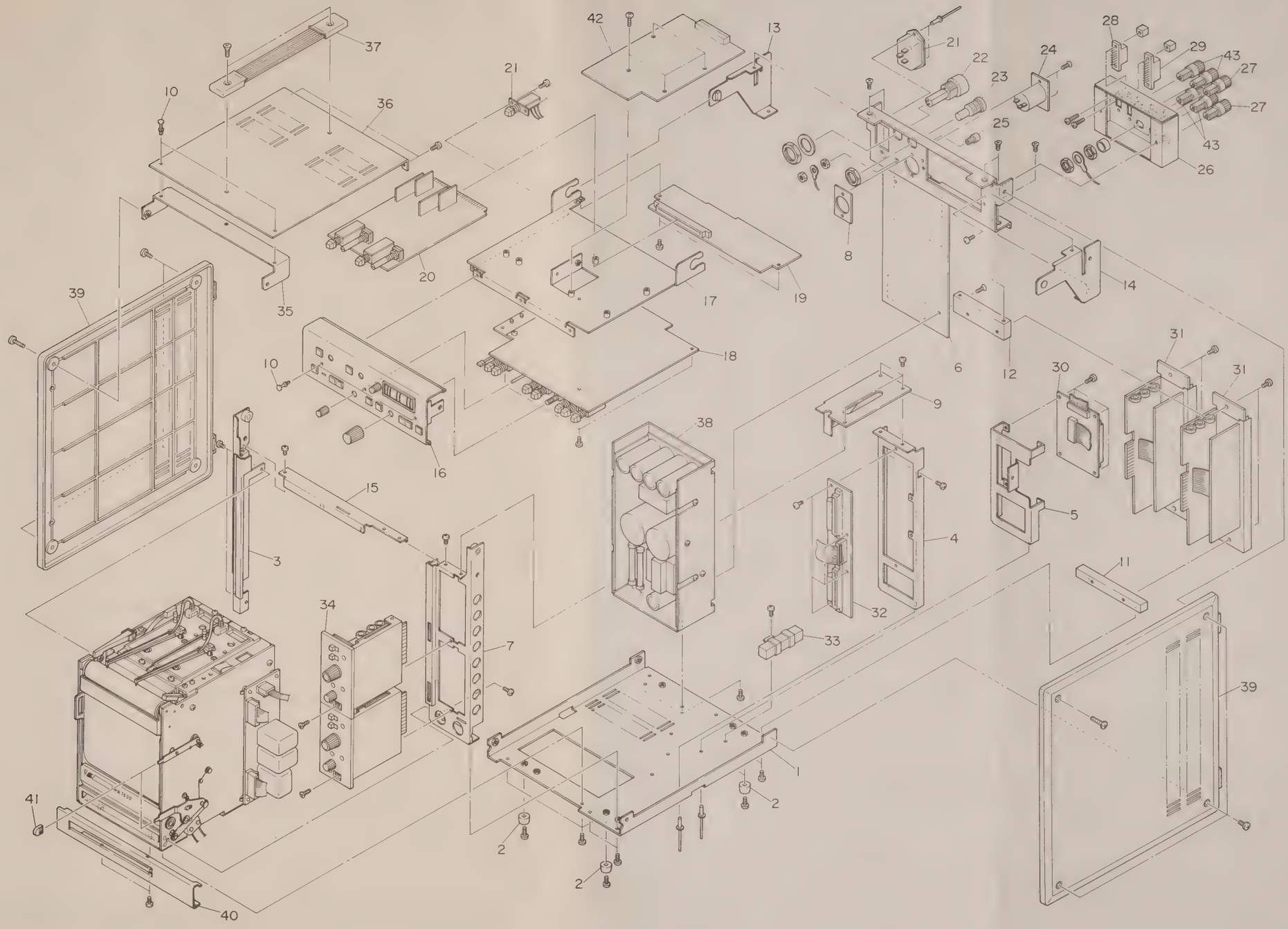
2 VR1 Adjustment

Adjust VR1 so that, at 100mm/s feed speed, the voltage at card edge connector pin B13 is approximately 11V.

Approximate B13 Pin Voltages for Various Feed Speeds

Feed speed	B13 pin voltage
100mm/s	Approx. 11V
50mm/s	Approx. 9V
25mm/s	Approx. 8.1V
10mm/s	Approx. 7.6V
5mm/s	Approx. 7.5V
2.5mm/s	Approx. 7.4V
1mm/s	Approx. 7.3V

4–1 MAIN FRAME



4-1. Main Frame

Figure	Part No.	Description		Remarks
1	075000013	Cover, Bottom		
2	360771010	Cushion		
3	075000021	Front Panel L		
4	075000041	Support, MB-C		
5	075000161	Support, MB-B		
6	075000111	Cover, Rear		
7	075000051	Front Panel R		
8	075000150	Nut		
9	075000190	Arm		
10	30000203	Rivet 3 x 4.5		
11	075000421	Support A		
12	075000430	Support B		
13	075000441	Stay L		
14	075000451	Stay R		
15	075000130	Front Cover		
16	075008111	Control Panel		
17	075000300	Support, MB-A		
18	777500018	Chart Drive Unit		
19	777500014	Chart Drive Mother Board		
20	777500020	S Heat-Control Unit		
21	513200107	NC174		
22	512400002	SN-2059		AC
23	512300043	FEU 031-1661		DC
24	513400173	HA16R-3P		
25	514400004	SQ0204-02		
26	075008150	Support, Terminal		
27	514400010	W-B-2		
28	513400109	FCN-361P 008-AG		
29	513400121	FCN-361P 016-AG		
30	777500015	Main Amplifier Mother Board		
31		Main Amplifier		
32	777500016	Preamplifier Mother Board		
33		RGU15HS2OHM		
34		Amplifier Unit		
35	075005040	Support, Upper		
36	075005021	Cover, Upper		
37	306500260	THA-130-P-F		
38	518100010	Converter S-84330		
39	075005011	Side Cover		
40	075005031	Front Panel A		
41	067113180	Cap		
42	797500212	Printer Controller		
43	514400010	W-R-2		

4-2 CHART DRIVE MECHANISM

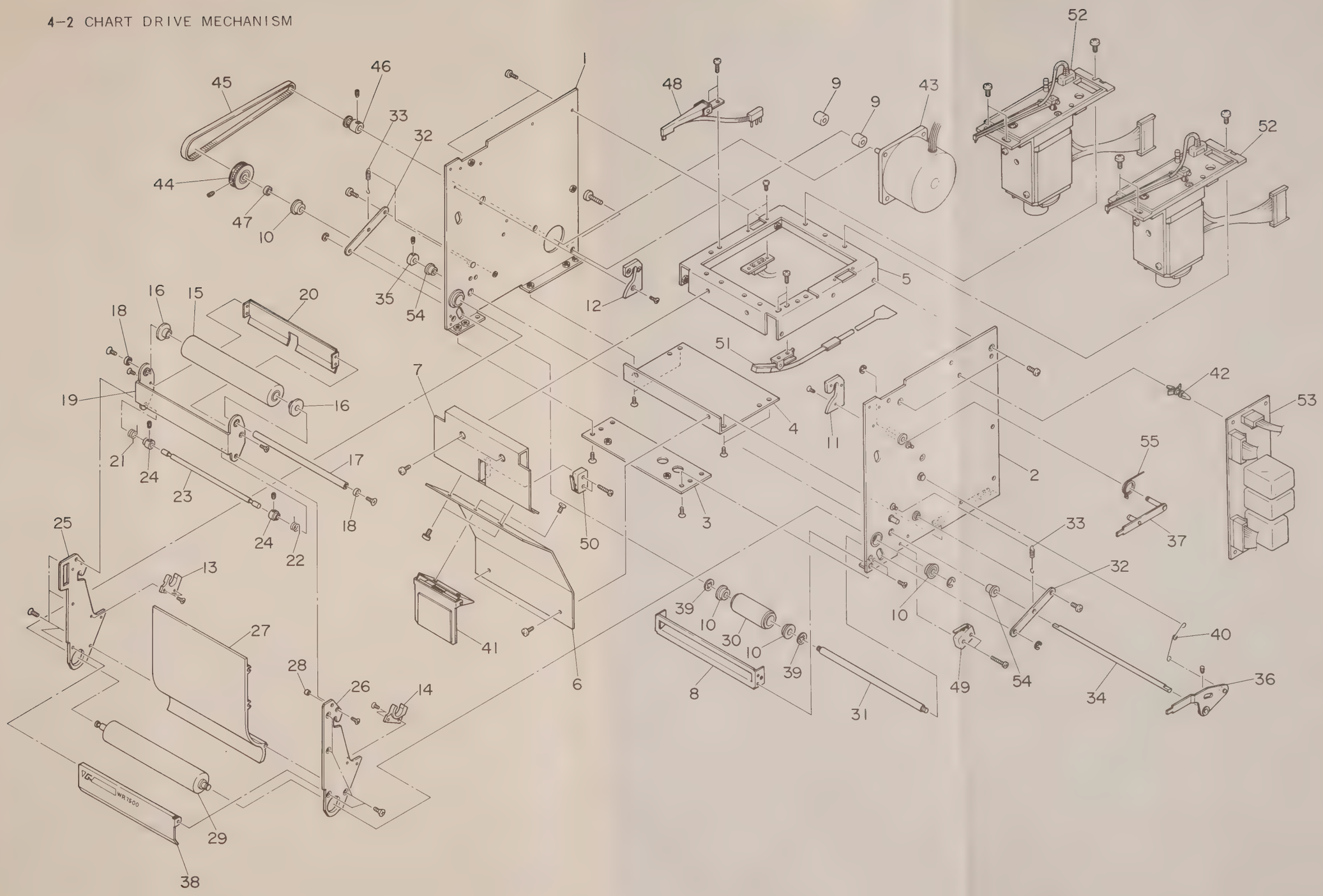
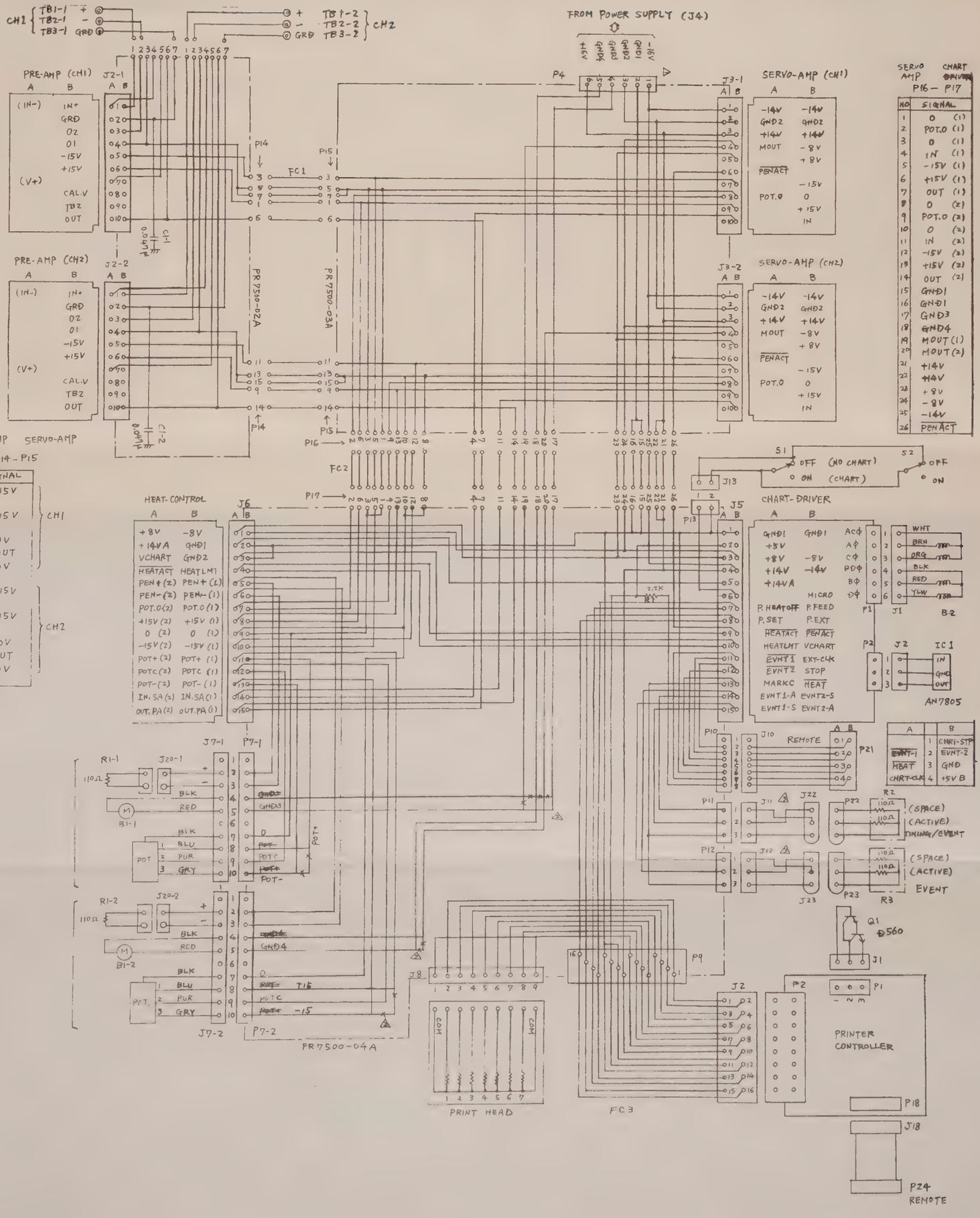


Figure	Block No.	Description		Remarks
46	070016011	Drive Pulley		
47	075006040	Spacer, Pulley		
48	777500021	Maker-A		
49	508401010	SS-5GL		
50	508401025	SS-5GL13-F		
51	777500103	Print-Head		
52	777500052	Pen Motor GW7501		
53	777500012	Control Unit		
54	320326402	F4 x 7 x 3-BBB		
55	075002480	Spring, Stock		



NO	SIGNAL
1	0 (1)
2	POT.0 (1)
3	0 (1)
4	IN (1)
5	-15V (1)
6	+15V (1)
7	OUT (1)
8	0 (2)
9	POT.0 (2)
10	0 (2)
11	IN (2)
12	-15V (2)
13	+15V (2)
14	OUT (2)
15	GND1
16	GND1
17	GND3
18	GND4
19	MOUT (1)
20	MOUT (2)
21	+14V
22	+14V
23	+8V
24	-8V
25	-14V
26	PENACT

NO	SIGNAL	
1	+15V	CH1
2		
3	-15V	
4		
5	0V	
6	OUT	
7	0V	
8		
9	+15V	CH2
10		
11	-15V	
12		
13	0V	
14	OUT	
15	0V	
16		

5-1~2

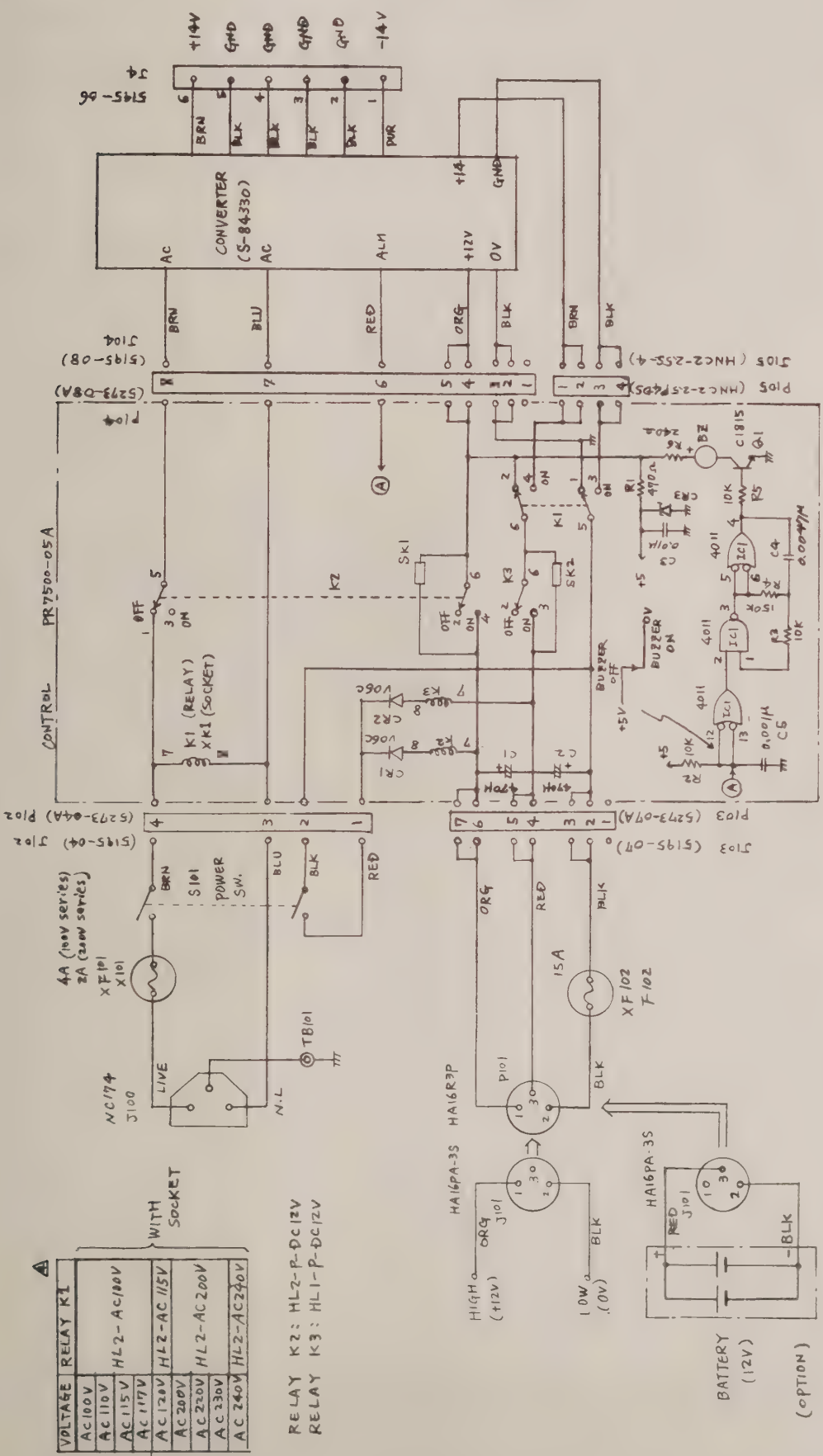
Wiring Diagram

Figure	Part No.	Description	Type	Remarks
R1-1	772310114	Pen 40mmpp	KT201	
R1-2	772310114	Pen 40mmpp	KT201	
R2	937500200	Marker Pen	KT213	
R3	937500250	Marker Pen	KT214	Option
J1	G513400036	Connector, Receptacle 6P	HNC2-2.5S-6	
J7-1	G513400072	" " 10P	HNC2-2.5S-10	
J7-2	"	" " "	"	
J10	G513400080	" " 8P	HNC2-2.5S-8	
J11	G513400041	" " 3P	HNC2-2.5S-3	
J12	"	" " "	"	
J13	G513400043	" " 2P	HNC2-2.5S-2	
J20-1	G513200201	" Socket 2P	S-I0320	
J20-2	"	" " "	"	
J22	A513200311	" " 3P	3965SC	
J23	"	" " "	"	Option
J21	A513400111	" Receptacle 8P	FCN-361J008-AG	
	A513400112	Cover	FCN-360C008-B	For J21
P21	513500424	Connector, Pin Header 8P	FCN-361P008-AG	
	A520110081	Nut	FCN-360A4	x2 For P21
P24	A513400121	Connector, Pin Header 16P	FCN-361P16-AG	
S1	A508401025	Micro Switch	SS-5GLB-F	
S2	G508401010	"	SS-5GL	
B2	A509410016	Stepping Motor	PH55-D1-40E	
CNP	G513400042	Contact Pin	HNC-2.5S-B	For J1
"	"	"	"	For J10
"	"	"	"	For J11
"	"	"	"	For J12
"	"	"	"	For J13
TB1-1	514400010	Input Terminal, Red	W-R-2	
TB2-1	"	" "	"	
TB3-1	514400011	" Black	W-B-2	
TB1-2	514400010	" Red	W-R-2	
TB2-2	"	" "	"	
TB3-2	514400011	" Black	W-B-2	
J18	A513400051	Connector, Receptacle 16P	FCN-361J016-AG	Option
P24	A513400121	" Plug 16P	FCN-361P016-AG	Option
	A520110081	Nut	FCN-360A4	x2 For P24
J24	A513400051	Connector, Receptacle 16P	FCN-361J016-AG	Option
	A513400052	Cover	FCN-360C016B	For J24
P.HEAD	B596800001	Print Head with FPC	KS-07A	Option

Mother Board

Figure	Part No.	Description	Type	Remarks
PCB	A511750040	Printed Circuit Board	7500-04A	
R1	G501810322	R, Metal Film 2.2K 1/4W ±1%	RN1/4-2.2KF	
J5	A513301512	Connector, Card Edge 15P	225J21521-497	
J6	"		"	
J8	A513301210	Connector, Receptacle 9P	HBLB9S-1	Option
P7-1	G513400075	Connector, Pin Header 10P	HNC2-2.5P-10DS	
P7-2	"	"	"	
P10	G513400079	Connector, Pin Header 8P	HNC2-2.5P-8DS	
P11	G513400039	3P	HNC2-2.5P-3DS	
P12	"		"	
P13	G513400038	2P	HNC2-2.5P-2DS	
P17	A520110144	26P	FCN-744P026-AU/R	
FC3	A520110147	Flat Cable with Connector	L185-16P-FCN	Option
PCB	A511750030	Printed Circuit Board	7500-03A	
J3-1	A513300604	Connector, Receptacle 10P	225J21021-487	
J3-2	"	"	"	
P4	A513400182	Connector, Pin Header 6P	5274-06A	
FC1	A520110145	Flat Cable with Connector	L140-16P-FCN	
FC2	A520110146		L165-26P-FCN	
PCB	A511750020	Printed Circuit Board	7500-02A	
C1-1	G502601003	C, Oil 0.047μ 630WV	PMA-2J-473	
C1-2	"	"	"	
J2-1	A513300604	Connector, Receptacle 10P	225J21021-487	
J2-2	"	"	"	
P14	A513400145	Connector, Pin Header 16P	FCN744P016AUR	

5-2 POWER SUPPLY CONVERTER CONTROL UNIT



VOLTAGE	RELAY K1	
AC100V	HL2-AC100V	WITH SOCKET
AC110V		
AC115V		
AC117V		
AC120V	HL2-AC115V	
AC200V		
AC220V	HL2-AC200V	
AC230V		
AC240V	HL2-AC240V	

RELAY K2: HL2-P-DC12V
RELAY K3: HL1-P-DC12V

Power Supply

Figure	Part No.	Description	Type	Remarks
J4		Connector, Receptacle 6P	5195-06	
P101	A513400173	Connector, Plug 3P	HA16R-3P	
J100	A513200107	Inlet	NC174	
J101	A513400183	Connector, Receptacle 3P	HA16PA-3S	
J102	A513400174	" 4P	5195-04	
J103	A513400175	" 7P	5195-07	
J104		" 8P	5195-08	
J105		" 4P	HNC2-2.5S-4	
F101	A512300046	Fuse 4A	SM-1101-4A	100V Series
F101	G512300002	" 2A	SM-1101-2A	200V Series
F102	A512300045	" 15A	SM-1101-15A	
XF101	G512400002	Fuse Holder	SN-2059	
XF102-A	A512300043	" Body	FEU031-1673	
XF102-B	A512300044	" Cap	FEU031-1661	
CON-VERTER	A518100010	Converter	S-84330	
TB101	G514400004	Terminal	SQ0204-02	
CNP	A513400178	Contact Pin	5225TL	For J102
CNP	"	"	"	For J103
S101	A508101010	Switch, Push	1P-0008AC1920	
CAP	B516100009	Cap, Red	B101	For S101
DC CORD	A520100261	DC Cord with Connector	7500DC POWER CORD	
AC CORD	A520100008	AC Cord	VM1165B-VM1172	
BATTERY		Battery	LCR12V6.5	Option

Converter

Figure	Part No.	Description			Type	Remarks
Q1		Tr. NPN	10A	800V 150W	2SC3307	
Q2			25A	80V 80W	2SD1049	
Q3		〃	〃	〃 〃	〃	
Q4					2SC2236	
Q5			3A	60V 1.5W	2SC1815	
Q6			〃	〃 〃	〃	
CR1		D.			SM6J45	
CR2					4J4B41	
CR3					RU1P	
CR4					12CL2C41	
CR5					5BL2C41	
CR6					RD8.2JB	
CR7					30DF1	or 30DF2
CR8					DFG2A8	
CR9					〃	
CR10		〃			RD8.2JB	
CR11					RU1P	
CR12					〃	
CR13					RG2	
R1		R.	12Ω	5W	RGU5PH 12OHM	
R2		〃	1K	1.4W	NS1/4S 1KOHM	
R3		〃	27Ω	2W	ERG-2ANJ270	
R4			33K	〃	ERG-2ANJ333	
R5			〃	〃	〃	
R6			120K		MOR-2B120KOHM	
R7		〃	22K	3W	ERG-3ANJ223	
R8			〃	〃	〃	
R9		〃	0.27Ω	2W	RGC2T OHM $^{0.18\sim}_{0.56}$	
R10		〃	47K	1W	ERG-1ANJ473	
R11			39Ω	2W	ERG-2ANJ390	
R12		〃	2Ω	15W	RGU15HS 2 OHM	
R13			47Ω	1.2W	RE55E-YQ-47OHM	
R14			2.2K	1.4W	NAS1/4-S 2.2kOHM	
R15			1.2K	〃	NAS1/4S1.2kOHM	
R16			5.6K	1.2W	ERG-12ANJ562	
R17			270Ω	2W	ERG-2ANJ271	
R18			1.2Ω	1W	ERX-1ANJ1R2	
R19			15K	1.4W	NAS1/4S15kOHM	
R20			470Ω	〃	NAS1/4S470OHM	
R21			15K	〃	NAS1/4S15kOHM	
R22			10K	〃	CM1/4 10kOHM	
R23			39Ω	15W	RGU15HS39OHM	
R24			0.27Ω	2W	RGC2T OHM $^{0.18\sim}_{0.56}$	

Figure	Part No.	Description	Type	Remarks
R25		R, 470Ω 1/2W	RE55-YQ-470OHM	
RV1		Trimmer 2K	3321P-10C-202	
C1		C, Ceramic 2200P	ECK-DHS222PE	
C2		〃 〃	〃	
C3		C, Myler Film 0.1μ 630WV	CF921L2J104K	
C7		C, Electrolytic 560μ 250WV	KM250VNSN560	or ECES2EG 561Y
C8		〃 〃 〃	〃	〃
C9		C, Myler Film 0.1μ 630WV	CF921L2J104K	
C11		C, Electrolytic 100μ 25WV	SM25VB-100	
C13		〃 3300μ 〃	KM25VB-3300	
C14		〃 〃 〃	〃	
C15		〃 2200μ 〃	KM25VB-2200	
C16		〃 3300μ 〃	KM25VB-3300	
C17		〃 〃 〃	〃	
C18		〃 0.1μ 100WV	CQ92MC 104K	
C19		C, Electrolytic 2200μ 25WV	KM25VB-2200	
C20		〃 100μ 〃	SM25VB-100	
C21		C, 0.01μ 100WV	CQ92MC 103K	
C22		C, 0.001μ 〃	CQ92MC 102K	
C23		C, 0.01μ 〃	CQ92MC 103K	
C24		C, 〃 〃	〃	
C25		C, 0.01 ~ 0.047μ 〃	CQ92MC K103~473	
T1		Transformer ST062	ST16N300NR4EI40	
T2		〃 ST061	ST336R15E3EI40	
T3		〃 DT010	DT8-4-0-T7-14-3.5	
U1		Hybrid IC	HIC A-541	
J1		Connector, Receptacle 8P	5195-08	
CNP		Contact Pin	5225 TL	For 51
J2		Connector, Receptacle 6P	5195-06	
CNP		Contact Pin	5225TL	For J2
J3		Connector, Receptacle 4P	HNC2-2.5S-4	
CNP		Contact Pin	HNC-2.5S-A	For J3
L1		Coil	SC-02-200	

Control Unit

Figure	Part No.	Description	Type	Remarks
CR1	B503100021	Di, Si V_R = 200V I_F = 4A	V06C	
CR2	"	" " "	"	
CR3	G503100062	Zener 5.2V 0.5W ±5%	RD5.1EB3	
IC1	G503300062	IC, CMOS Quad 2-Input NAND	TC4011BP	
Q1	G503203014	T, NPN 30V 100mA 200mW	2SC1815.Y	
R1	G501810247	R, Metal Film 470Ω 1/4W ±1%	RN1/4-470F	
R2	G501810410	" 10K " "	RN1/4-10KF	
R3	"	" " " "	"	
R4	G501810515	" 150K " "	RN1/4-150KF	
R5	G501810410	" 10K " "	RN1/4-10KF	
R6	G501810224	" 240Ω " "	RN1/4-240F	
C1	A502103066	C, Electrolytic 470μ 25WV	ECEB1ES471	
C2	"	" " "	"	
C3	G502403007	C, Ceramic 0.01μ 50WV	ULD06-103-L2A	
C4	G502303007	C, Myler Film 0.0047μ "	MFL-05D47	
C5	G502303002	" 0.001μ "	MFL-05D1	
K1	A515110029	Relay AC100V	HL2-AC100V	For AC100, 110, 115, 117V
K1	A515200008	" AC115V	HL2-AC115V	For AC120V
K1	A515110032	" AC200V	HL2-AC200V	For AC200, 220, 230V
K1	A515200010	" AC240V	HL2-AC240V	For AC240V
K2	515110030	" DC12V	HL2-P-DC12V	
K3	515110031	" DC12V	HL1-P-DC12V	
SK1	G518110003	Spark Killer	S-1201	
SK2	"	"	"	
XK1	A513500423	Relay Socket	HL2-PS	
BZ	A519300001	Buzzer	SD161201	
P102	A513400179	Connector, Pin Header 4P	5273-4A	
P103	A513400180	" 7P	5273-7A	
P104	A513400181	" 8P	5273-8A	
P105	A513400070	" 4P	HNC2-2.5P4DS	
PCB	A511750050	Printed Circuit Board	7500-05A	

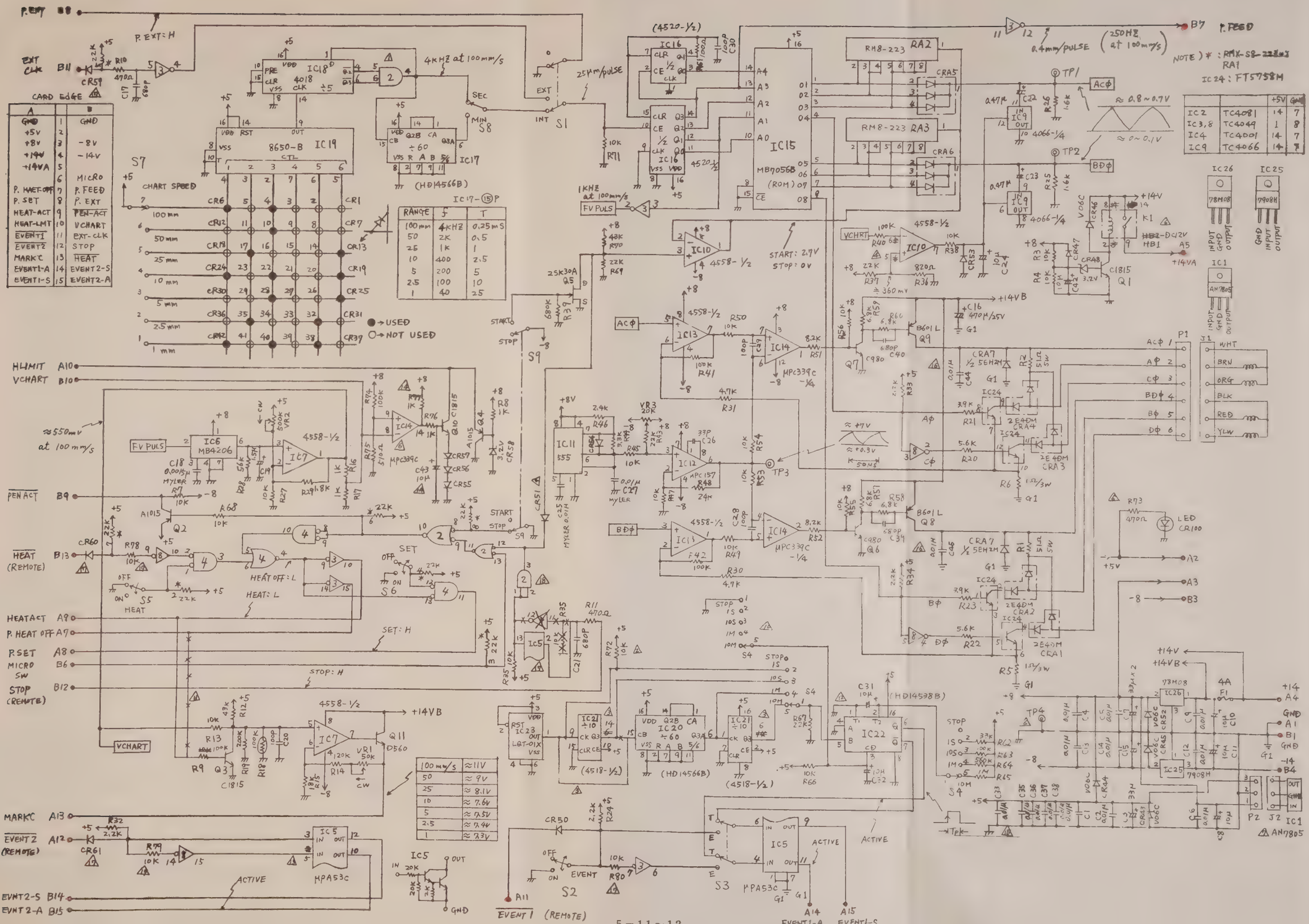

P. EXT
P. EXT: H
EXT CLK B11
CR59
CARD EDGE
A
B
GND +5V +8V -8V +19V -14V +14VA MICRO P. FEED P. EXT PEN-ACT VCHART EXT-CLK STOP HEAT EVENT2-S EVENT2-A
P. HEAT-OFF P. SET HEAT-ACT HEAT-LMT EVENT1 EVENT2 MARK'C EVENT1-A EVENT1-S
IC18 4018 ÷5
4KHZ at 100mm/s
SEC MIN S8
IC19 8650-B
IC17 (HD14566B)
S7
CHART SPEED
100mm 50mm 25mm 10mm 5mm 2.5mm 1mm
CR6 CR1 CR7 CR13 CR19 CR25 CR31 CR37
CR12 CR18 CR24 CR30 CR36 CR42
IC17-⑮P
RANGE F T
100mm 4KHZ 0.25mS
50 2K 0.5
25 1K 1
10 400 2.5
5 200 5
2.5 100 10
1 40 25
●→USED ○→NOT USED
EXT INT S1
25PM/PULSE
IC16 (4520-½)
IC15 MB70568 (ROM)
IC16 4520-½
1KHZ at 100mm/s
FV PULS
START: 2.7V STOP: 0V
START STOP S9
IC10 4558-½
IC13 4558-½
IC14 MPC339C -¼
IC11 555
IC12 MPC157
IC6 MB4206
IC7 4558-½
IC5
IC21 ÷10
IC20 ÷60
IC22
(HD14538B)
(4518-½)
(4520-½)
(HD14566B)
RM8-223 RA2 RA3
CRA5 CRA6
TP1 TP2 TP3 TP4
AC∅ BD∅ A∅ B∅ C∅ D∅
≈0.8~0.7V ≈0~0.1V
≈+7V ≈+0.3V 50mS
IC24 2E40M CRA1 CRA2 CRA3 CRA4
CRA7 ½ 5EH2M
IC1 AN7805
IC26 78M08
IC25 7908H
VCHRT
+14VB +14VA
Q1 C1815
Q7 Q8 Q9 B601L
K1 HB1-DC12V
P1 J1
WHT BRN ORG BLK RED YLW
LED CR100
HLIMIT A10
VCHART B10
PEN ACT B9
HEAT (REMOTE) B13
HEAT ACT A9
P. HEAT OFF A7
RSET A8
MICRO SW B6
STOP (REMOTE) B12
MARK'C A13
EVENT2 (REMOTE) A12
EVNT2-S B14
EVNT2-A B15
EVENT1 (REMOTE) A11
EVENT1-A A14
EVENT1-S A15
S5 HEAT
S6 SET
S4 10M
S2 EVENT
S3
ACTIVE
HPA53C
≈550mV at 100mm/s
HEAT OFF: L
HEAT: L
SET: H
STOP: H
0.4mm/PULSE (250HZ at 100m/s)
NOTE) * : RM8-SR-223 RA1
IC24: FT5758M
IC2 TC4081 14 7
IC3,8 TC4049 1 8
IC4 TC4001 14 7
IC9 TC4066 14 7

Chart Driver

Figure	Part No.	Description	Type	Remarks
IC1	A503301059	IC, Regulator 5V 1A	AN7805	
IC2	G503303371	" , CMOS Quad 2-Input Positive and GATE	TC4081UBP	
IC3	G503300094	" , CMOS Hex Inverting Buffer	TC4049BP	
IC4	G503300124	" , CMOS Quad 2-Input NOR	TC4001BP	
IC5	G503300053	" , Darlington Transistor Array	UPA53C	
IC6	A503300122	" , F/V Converter	MB4206	
IC7	G503300054	" , Op-Amp Dual	UPC4558C	
IC8	G503300094	" , CMOS Hex Inverting Buffer	TC4049BP	
IC9	G503300052	" , CMOS Dual Bilateral Switch	TC4066BP	
IC10	G503300054	" , Op-Amp Dual	UPC4558C	
IC11	A503303473	" , Timer	UPC1555C	
IC12	A503300123	" , Op-Amp	UPC157C	
IC13	G503300054	" , Op-Amp Dual	UPC4558C	
IC14	A503300121	" , Comparator	UPC339C	
IC15	A503300148	" , NMOS Bipolar Memory	MB7056-B	
IC16	A503303431	" , CMOS Dual Binary up Counter	TC4520BP	
IC17	A503302077	" , CMOS Divide-By-60 Counter	HD14566BP	
IC18	G503300119	" , CMOS Presettable Divide-By-"N" Counter	TC4018BP	
IC19	A503303407	" , CMOS Programmable Divider	8650B "Seiko"	
IC20	A503302077	" , Time Base Generator	HD14566BP	
IC21	A503301015	" , CMOS Dual BCD Up Counter	TC4518BP	
IC22	A503301035	" , Dual Precision Monostable Multivibrator	HD14538B	
IC23	J 503303828	" , Time Base Generator	LQT-01X	
IC24	J 503303827	" , Transistor Array	FT5758M	
IC25	G503301050	" , Regulator −8V 1A	UPC7908H	
IC26	G503301049	" , Regulator 8V 500mA	UPC78M08	
Q1	G503203014	T, NPN 30V 100mA 200mW	2SC1815,Y	
Q2	G503203016	", PNP −30V −100mA −200mW	2SA1015,Y	
Q3	G503203014	", NPN 30V 100mA 200mW	2SC1815,Y	
Q4	G503203016	", PNP −30V −100mA −200mW	2SA1015,Y	
Q5	G503200027	", N-J-FET	2SK30A-Y	
Q6	A503203017	", NPN 70V 100mA 400mW	2SC980,O	
Q7	"	", " " " "	"	
Q8	A503203018	", PNP −100V −5A 30W	2SB601L	
Q9	"	", " " " "	"	
Q10	G503203014	", NPN 30V 100mA 200mW	2SC1815,Y	
Q11	G503200028	", " 100V 5A 30W	2SD560	
CRA1	G503100063	Di, Si, Diode Module	2E4DM, NEC	
CRA2	"	" "	"	
CRA3	"	" "	"	
CRA4	"	" "	"	
CRA5	J 503100157	", Si, Diode Array	DAN401	

Figure	Part No.	Description	Type	Remarks
CRA6	J 503100157	Di, Si, Diode Array	DAN401	
CRA7	A503100066	" " Diode Module	5EH2M, NEC	
CR4	G503100020	Di, Si V_R = 30V I_F = 100mA	1S953	
CR6	"	" " " "	"	
CR10	"	" " " "	"	
CR13	"	" " " "	"	
CR17	"	" " " "	"	
CR19	"	" " " "	"	
CR22	"	" " " "	"	
CR24	"	" " " "	"	
CR25	"	" " " "	"	
CR28	"	" " " "	"	
CR32	"	" " " "	"	
CR35	"	" " " "	"	
CR38	"	" " " "	"	
CR40	"	" " " "	"	
CR42	"	" " " "	"	
CR43	B503100021	" " V_R = 200V I_F = 4A	V06C	
CR44	"	" " " "	"	
CR45	"	" " " "	"	
CR46	"	" " " "	"	
CR47	G503100020	" " V_R = 30V I_F = 100mA	1S953	
CR48	G503100052	", Zener 3.2V 0.5W ±5%	RD3.3EB2	
CR50	G503100020	", Si V_R = 30V I_F = 100mA	1S953	
CR51	"	" " " "	"	
CR52	B503100021	" " V_R = 200V I_F = 4A	V06C	
CR53	G503100020	" " V_R = 30V I_F = 100mA	1S953	
CR54	"	" " " "	"	
CR55	"	" " " "	"	
CR56	"	" " " "	"	
CR57	"	" " " "	"	
CR58	G503100052	", Zener 3.2V 0.5W ±5%	RD3.3EB2	
CR59	G503100020	", Si V_R = 30V I_F = 100mA	1S953	
CR60	"	" " " "	"	
CR61	"	" " " "	"	
CR100	B512100019	LED	SLB-26UU	
R1	A501609724	R, Wirewound 51Ω 5W ±5%	MU5P-51J	
R2	"	" " " " "	"	
R3	G501810410	R, Metal Film 10K 1/4W ±1%	RN1/4-10KF	
R4	"	" " " " "	"	
R5	A501609732	" " 1Ω 3W ±5%	RSF3B-1 ohm	
R6	"	" " 1Ω " "	"	
R7	G501810410	" " 10K 1/4W ±1%	RN1/4-10KF	

Figure	Part No.	Description				Type	Remarks
R8	G501810310	R, Metal Film	1K	1/4W	±1%	RN1/4-1KF	
R9	G501810510	", "	100K	"	"	RN1/4-100KF	
R10	G501810247	", "	470Ω	"	"	RN1/4-470F	
R11	"	", "	"	"	"	"	
R12	G501810443	", "	43K	"	"	RN1/4-43KF	
R13	G001810410	", "	10K	"	"	RN1/4-10KF	
R14	G501810512	", "	120K	"	"	RN1/4-120KF	
R15	G501810418	", "	18K	"	"	RN1/4-18KF	
R16	G501810310	", "	1K	"	"	RN1/4-1KF	
R17	"	", "	"	"	"	"	
R18	B503103012	Thermistor B-Class	100K			100KD-7	
R19	G501810520	R, Metal Film	200K	1/4W	±1%	RN1/4-200K	
R20	G501810356	", "	5.6K	"	"	RN1/4-5.6KF	
R21	G501810339	", "	3.9K	"	"	RN1/4-3.9KF	
R22	G501810356	", "	5.6K	"	"	RN1/4-5.6KF	
R23	G501810339	", "	3.9K	"	"	RN1/4-3.9KF	
R24	G501810322	", "	2.2K	"	"	RN1/4-2.2KF	
R25	G501810316	", "	1.6K	"	"	RN1/4-1.6KF	
R26	"	", "	"	"	"	"	
R27	G501810410	", "	10K	"	"	RN1/4-10KF	
R28	G501810456	", "	56K	"	"	RN1/4-56KF	
R29	G101810318	", "	1.8K	"	"	RN1/4-1.8KF	
R30	G501810347	", "	4.7K	"	"	RN1/4-4.7KF	
R31	"	", "	"	"	"	"	
R32	G501810322	", "	2.2K	"	"	RN1/4-2.2KF	
R33	"	", "	"	"	"	"	
R34	"	", "	"	"	"	"	
R35	G501810410	", "	10K	"	"	RN1/4-10KF	
R36	G501810282	", "	820Ω	"	"	RN1/4-820F	
R37	G501810422	", "	22K	"	"	RN1/4-22KF	
R38	G501810410	", "	10K	"	"	RN1/4-10KF	
R39	G501810568	", "	680K	"	"	RN1/4-680KF	
R40	G501810510	", "	100K	"	"	RN1/4-100KF	
R41	"	", "	"	"	"	"	
R42	"	", "	"	"	"	"	
R43	G501810422	", "	22K	"	"	RN1/4-22KF	
R44	G501810333	", "	3.3K	"	"	RN1/4-3.3KF	
R45	G501810410	", "	10K	"	"	RN1/4-10KF	
R46	G501810324	", "	2.4K	"	"	RN1/4-2.4KF	
R47	G501810410	", "	10K	"	"	RN1/4-10KF	
R48	G501810424	", "	24K	"	"	RN1/4-24KF	
R49	G501810410	", "	10K	"	"	RN1/4-10KF	
R50	G501810410	", "	"	"	"	RN1/4-10KF	
R51	G501810382	", "	8.2K	"	"	RN1/4-8.2KF	
R52	"	", "	"	"	"	"	

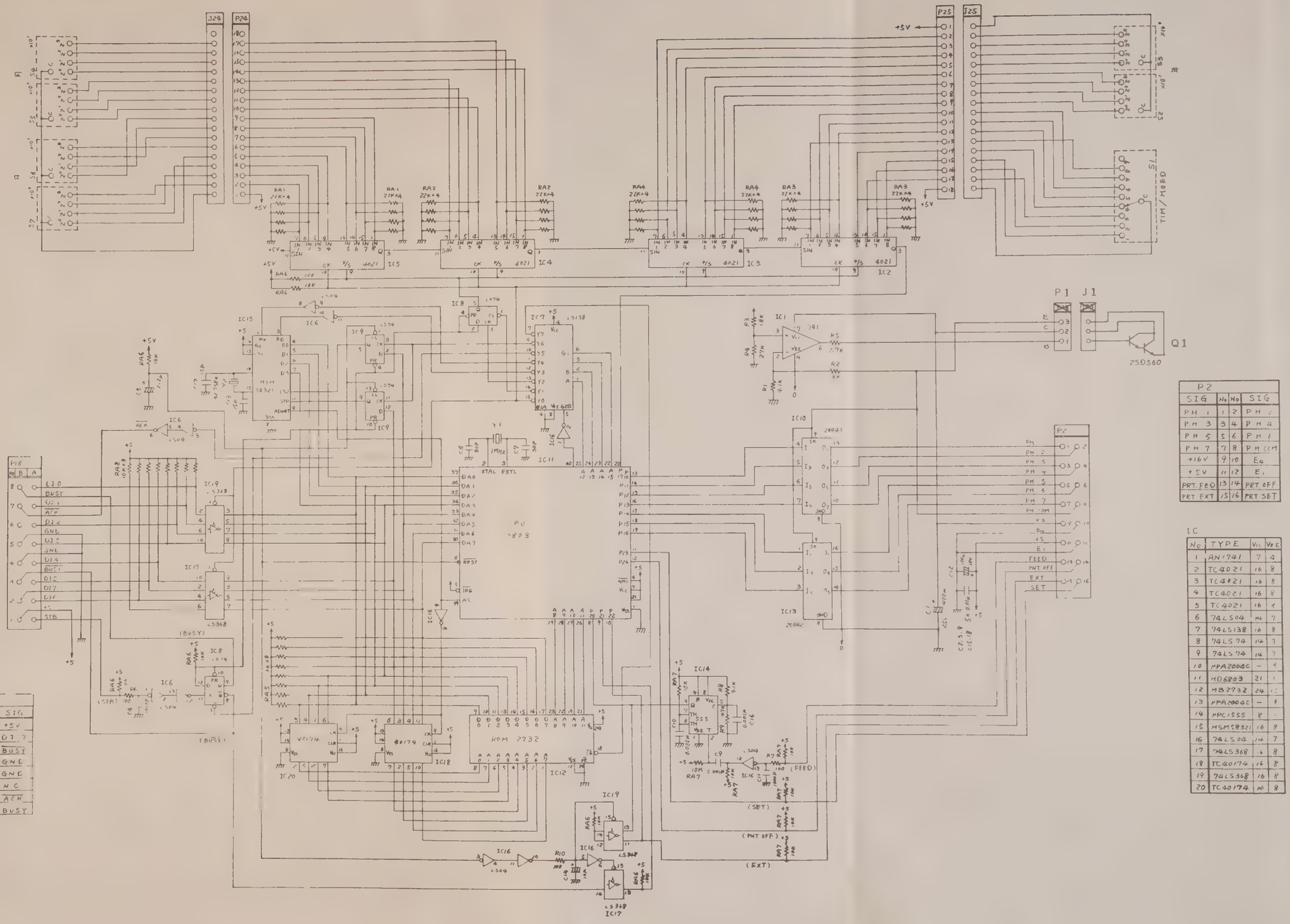
Chart Driver

Figure	Part No.	Description				Type	Remarks
R53	G501810410	R, Metal Film	10K	1/4W	±1%	RN1/4-10KF	
R54	"	", "	"	"	"	"	
R55	"	", "	"	"	"	"	
R56	G501810410	", "	"	"	"	"	
R57	G501810368	", "	6.8K	"	"	RN1/4-6.8KF	
R58	"	", "	"	"	"	"	
R59	"	", "	"	"	"	"	
R60	"	", "	"	"	"	"	
R61	G501810210	", "	100Ω	"	"	RN1/4-100F	
R62	G501810433	", "	33K	"	"	RN1/4-33KF	
R63	G501810510	", "	100K	"	"	RN1/4-100KF	
R64	G501810556	", "	560K	"	"	RN1/4-560KF	
R65	G501810610	", "	1M	"	"	RN1/4-1MF	
R66	G501810410	", "	10K	"	"	RN1/4-10KF	
R67	G501810422	", "	22K	"	"	RN1/4-22KF	
R68	G501810410	", "	10K	"	"	RN1/4-10KF	
R69	G501810422	", "	22K	"	"	RN1/4-22KF	
R70	G501810443	", "	43K	"	"	RN1/4-43KF	
R71	G501810410	", "	10K	"	"	RN1/4-10KF	
R72	"	", "	"	"	"	"	
R73	G501810247	", "	470Ω	"	"	RN1/4-470F	
R74	G501810510	", "	100K	"	"	RN1/4-100KF	
R75	G501810251	", "	510Ω	"	"	RN1/4-510F	
R76	G501810310	", "	1K	"	"	RN1/4-1KF	
R77	"	", "	"	"	"	"	
R78	G501810410	", "	10K	"	"	RN1/4-10KF	
R79	"	", "	"	"	"	"	
R80	"	", "	"	"	"	"	
RA1	B501002811	Resister Array	22K			RMX-S8-223-J	
RA2	"	"	"			"	
RA3	"	"	"			"	
VR1	G505103027	Trimmer	50K			GF6P-50K	
VR2	A505103029	"	500K			GF6P-500K	
VR3	A505102027	"	20K			GF6P-20K	
F1	A512300025	Fuse	4A			MC-4	
C1	G502403007	C, Ceramic	0.01μ	50WV		ULD06-103-L2A	
C2	"	" "	"	"		"	
C3	G502101028	", Electrolytic	33μ	25WV		SM25VB-33	
C4	G502403007	", Ceramic	0.01μ	50WV		ULD06-103-L2A	
C5	"	", "	"	"		"	
C6	"	", "	"	"		"	

Figure	Part No.	Description			Type	Remarks
C7	G502101028	C, Electrolytic	33μ	25WV	SM25VB-33	
C8	G502103023	", "	10μ	"	SM25VB-10	
C9	G502403007	", Ceramic	0.01μ	50WV	ULD06-103-L2A	
C10	G502103023	", Electrolytic	10μ	25WV	SM25VB-10	
C11	"	", "	"	"	"	
C12	G502403007	", Ceramic	0.01μ	50WV	ULD06-103-L2A	
C13	"	", "	"	"	"	
C14	"	", "	"	"	"	
C15	G502101028	", Electrolytic	33μ	25WV	SM25VB-33	
C16	A502103066	", "	470μ	"	ECEB1ES471	
C17	A502403036	", Ceramic	680P	50WV	UFD04SA681J-L0B	
C18	A502303019	", Myler Film	0.0015μ	"	MFL-05D15	
C19	G502203024	", Tantalum	1.5μ	20WV	CS15E1D1R5M	
C20	G502403029	", Ceramic	100P	50WV	UFD04SA101J-L0B	
C21	A502403036	", "	680P	"	UFD04SA681J-L0B	
C22	G502203015	", Tantalum	0.47μ	35WV	CS15E1VR47M	
C23	"	", "	"	"	"	
C24	G502103023	", Electrolytic	10μ	25WV	SM25VB-10	
C25	G502303004	", Myler Film	0.01μ	50WV	MFL-05S1	
C26	G502403034	", Ceramic	33P	"	RAU04SL330KL05AE	
C27	G502303004	", Myler Film	0.01μ	"	MFL-05S1	
C28	G502403029	", Ceramic	100P	"	UFD04SA101J-L0B	
C29	"	", "	"	"	"	
C30	"	", "	"	"	"	
C31	G502103023	", Electrolytic	10μ	25WV	SM25VB-10	
C32	"	", "	"	"	"	
C33	G502403007	", Ceramic	0.01μ	50WV	ULD06-103-L2A	
C35	G502403007	C, Ceramic	0.01μ	50WV	ULD06-103-L2A	
C36	"	", "	"	"	"	
C37	"	", "	"	"	"	
C38	"	", "	"	"	"	
C39	A502403036	", "	680P	"	UFD04SA681J-L0B	
C40	"	", "	"	"	"	
C42	G502103023	", Electrolytic	10μ	25WV	SM25VB-10	
C43	G502203018	", Tantalum	10μ	"	CS15E1E100M	
C44	G502203015	", Ceramic	0.01μ	50WV	ULD06-103-L2A	
C45	"	", "	"	"	"	
K1	A51510019	Relay	DC12V		HB1-DC12V	
S1	G508201018	Switch, Push			2UEE	
S2	A508201010	"			2U0A	
S3	G508201018	"			2UEE	
S4	J 508101032	Switch, Rotary			SBM2045	

Figure	Part No.	Description	Type	Remarks
S5	G508201018	Switch, Push	2UEE	
S7	A507111108	" , Rotary	J-R2000-1レン	
S8	G508201018	" , Push	2UEE	
S9	"	" , "	"	
P1	G513400062	Connector, Pin Header 6P	HNC2-2.5P6DS	
	B520100012	Insulating Sheet	30B6001	For IC1
P2	G513400039	Connector, Pin Header 3P	HNC2-25P3DS	
J2	G513400041	" , Receptacle 3P	HNC2-2.5S-3	For IC1
CNP	G513400042	Contact Pin	HNC-2.5S-B	For J2
KNOB	A516100025	Knob, Ivory	B201	Stop
"	B516100020	" Black	B911	
"	A516100034	" Black with Line	021-342	Timing
CAP	A516100029	Cap, "	040-362	
KNOB	B516100016	Knob, Black	021-222	Speed
CAP	B516100018	Cap, "	040-162	
PCB	J 511750010	Printed Circuit Board	7500-01B	

5-4 PRINTER CONTROLLER



P18			
SIG	A	B	SIG
STB	1	1	+5V
DI 6	2	2	DI 7
DI 5	3	3	BUSY
DI 4	4	4	GND
DI 3	5	5	GND
DI 2	6	6	NC
DI 1	7	7	ACK
DI 0	8	8	BUSY

P2			
SIG	No	No	SIG
PH 1	1	2	PH 2
PH 3	3	4	PH 4
PH 5	5	6	PH 6
PH 7	7	8	PH COM
+16V	9	10	E2
+5V	11	12	E1
PRT FEED	13	14	PRT OFF
PRT EXT	15	16	PRT SET

IC			
NO	TYPE	Vcc	VEE
1	AN1741	7	4
2	TC4021	16	8
3	TC4021	16	8
4	TC4021	16	8
5	TC4021	16	8
6	74LS04	14	7
7	74LS138	16	8
8	74LS74	14	7
9	74LS74	14	7
10	μPA2004C	—	8
11	HD6803	21	1
12	MB2732	24	12
13	μPA2004C	—	8
14	μPC1555	8	1
15	MSM5832	16	8
16	74LS04	14	7
17	74LS368	16	8
18	TC40174	16	8
19	74LS368	16	8
20	TC40174	16	8

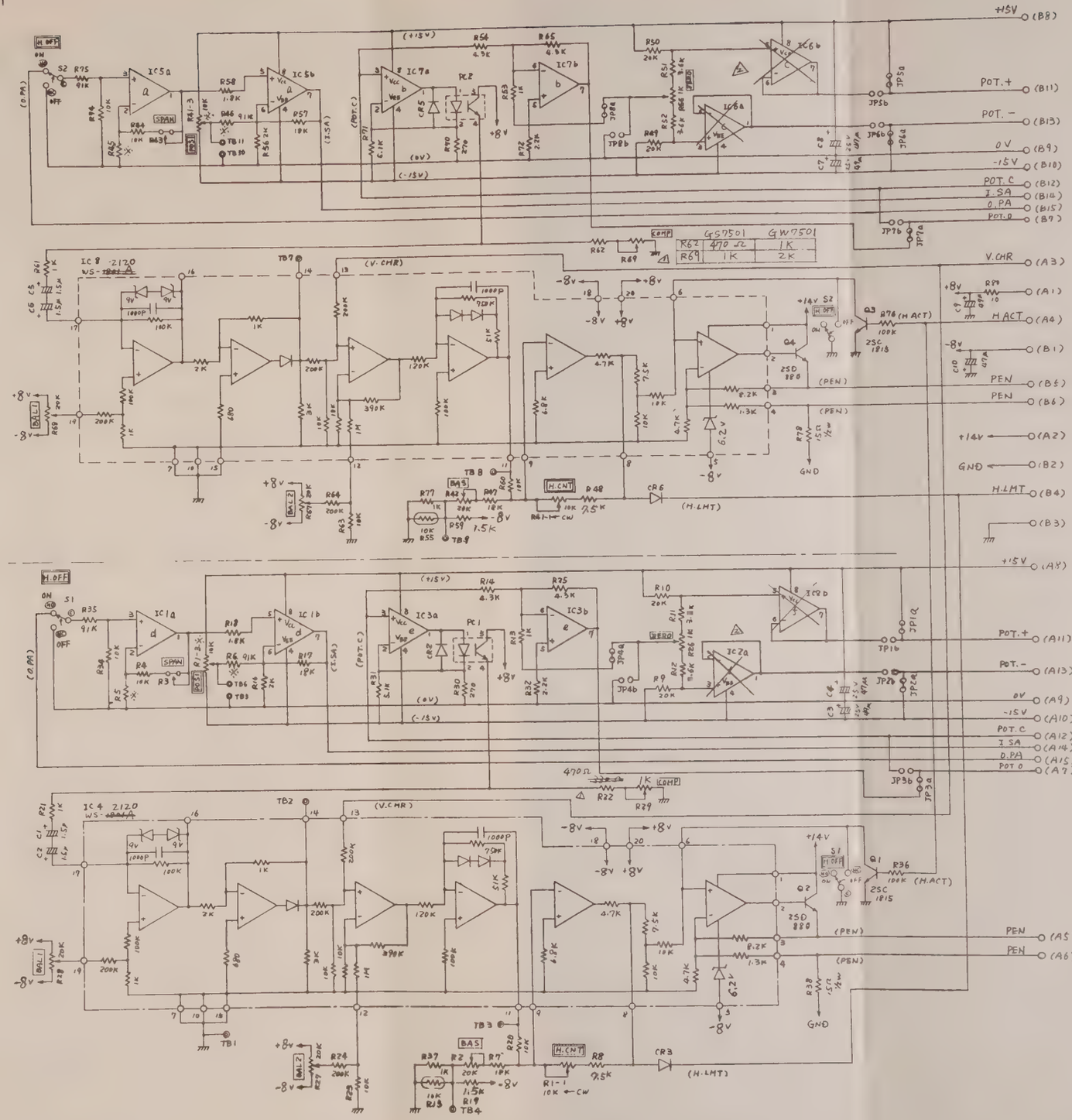
Printer Controller

Figure	Part No.	Description	Type	Remarks
IC1	503301056	IC, OP-Amp 741 TYP	AN1741	
IC2	503300131	" CMOS 8 Stage Shift Register	TC4021BP	
IC3	"	"		
IC4	"	"		
IC5	"	"		
IC6	503303471	IC, TTL Hex Inverter	M74LS04P	
IC7	503303472	" Binary-Octal Decoder	M74LS138P	
IC8	503303470	" Dual D.F.F	M74LS74AP	
IC9	"	"		
IC10	503300098	" Tr Array	μPA2004C	
IC11	503303435	" Micro-Computer	HD6803-CPU	
IC12	503302041	" EP-ROM	MBM2732A-35	
IC13	503300098	" Tr Array	μPA2004C	
IC14	503303473	" Timer	μPC1555C	
IC15	503303434	"	MSM58321RS	
IC16	503303471	" TTL Hex Inverter	M74LS04P	
IC17	503303469	" Hex Bus Driver	M74LS368AP	
IC18	503300141	" CMOS Hex D.F.F	TC40174BP	
IC19	503303469	" TTL Hex Bus Driver	M74LS368AP	
IC20	503303469	" CMOS Hex D.F.F	TC40174BP	
R1	501810391	R, Metal Film 9.1K 1% 1/4W 100ppm	RN1/4-9.1KF	
R2	501810418	" " 18K " "	RN1/4-18KF	
R3	"	"		
R4	501810427	" " 27K	RN1/4-27KF	
R5	501810327	" " 2.7K	RN1/4-2.7KF	
R6	501810210	" " 100Ω	RN1/4-100F	
R7	"			
R8	501810391	9.1K	RN1/4-9.1KF	
R9	501810447	47K	RN1/4-47KF	
R10	501810210	100Ω	RN1/4-100F	
RA1	501003340	R, Array 22K 5% 1/8W 100ppm	EXBF8-8-223J	
RA2	"	"		
RA3	"	"		
RA4	"	"		
RA5	501003331	10K	EXBF8-8-103J	
RA6		"		
RA7		"		
RA8		"		
C1	502103066	C, Electrolytic 470μ 25WV	ECEB1ES471	
C2	502403007	" Ceramic 10000P 50WV	ULD06-103-L2A	
C3	"	" "		
C4	502403015	1000P	ULD06-102	

Printer Controller

Figure	Part No.	Description	Type	Remarks
C5	502203005	C, Tantalum 2.2μ 20WV	CS15E1C2R2M	
C6	502703009	30P 100WV	Z05-100V-30P	
C7				
C8	502403007	" Ceramic 10000P 50WV	ULD06-103-L2A	
C9	502303002	" Myler Film 0.001μ 50WV	MFL05D1	
C10	502303008	" " 0.022μ	MFL05S22	
C11	502403015	" Ceramic 1000P "	ULD06-102	
C12	502103065	" Electrolytic 100μ 10WV	ECEB1AS101	
C13	502703007	15P 100WV	Z05-100V-15P	
C14	502203002	" Tantalum 10μ 20WV	CS15E1C100M	
C15	502403007	" Ceramic 10000P 50WV	ULD06-103-L2A	
C16	502303002	" Myler Film 0.001μ "	MFL05D1	
C17	502703007	15P 100WV	Z05-100V-15P	
C18	502403007	" Ceramic 10000P 50WV	ULD06-103-L2A	
Y1	502901014	Ceramic Oscillator 1MHz	CSA1MHZ	
Y2	502901015	Crystal Oscillator 32.768MHz	KF38G (32.768K)	
P2	513400145	Connector Plug 16P	FCN744P016A/R	
P18	513400050	" 16P	FCN365P016-G	
P1	513400060	3P	HNC2-2.5P3DSL	
P24	513400146	" 18P	HBLB18S-1	
P25	"		"	
J1	513400041	Connector Receptacle 3P	HNCD-2.5S-3	
CNP	513400042	Contact Pin	HNC-2.5S-B	
PCB	511680150	P.C.B.	PP6801-00	
Q1	503200028	T, 100V 5A 30W	2SD660	
S1	507111113	Switch Rotary 1-1-12	JPA-12	
S2	506401012		ATWA-206-206-P1	
S3				
S4				
S5				
S6				
S7				
FPC	511680510	For S4-S7	FPC-50-1	
FPC	511680520	For S1-S3	FPC-50-2A	

5-5 HEAT CONTROL UNIT



IC

No	TYPE	Vcc	Vee
8	WS-2120	20	18
5	MPC4558	8	4
6		8	4
7	MPC4558	8	4

PC

No	TYPE
2	NJM 5103D

Q

No	TYPE
4	2SD880
3	2SC1815

CR

No	TYPE
5	1S953
6	1S953

R

	40m	80m
R29	1K	
R22	470Ω	
R69	1K	2K
R62	470Ω	1K

IC

No	TYPE	Vcc	Vee
4	WS-2120	20	18
1	MPC4558	8	4
2		8	4
3	MPC4558	8	4

PC

No	TYPE
1	NJL 5103D

Q

No	TYPE
2	2SD880
1	2SC1815

CR

No	TYPE
2	1S953
3	1S953

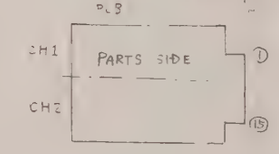
NOTE 1) ※ NOT USED
R1-3, R41-3
R5, R45
R6, R46

NOTE2) R3 : SHORT
R43: SHORT

NOTE3) GW7501→CH1 : USED
CH2 : NOT USED

PARTS A	SOLDER B	
SIG	No	SIG
+8V	1	-8V
+14V(A)	2	GND
V.CHR	3	GND
H.ACT	4	H.LMT
PEN (2)	5	PEN (1)
PEN (2)	6	PEN (1)
POT.O (2)	7	POT.O (1)
+15V (2)	8	+15V (1)
0V (2)	9	0V (1)
-15V (2)	10	-15V (1)
POT.+ (2)	11	POT.+ (1)
POT.C (2)	12	POT.C (1)
POT.- (2)	13	POT.- (1)
I SA (2)	14	I SA (1)
O PA (2)	15	O PA (1)

PL9



PR3500-05

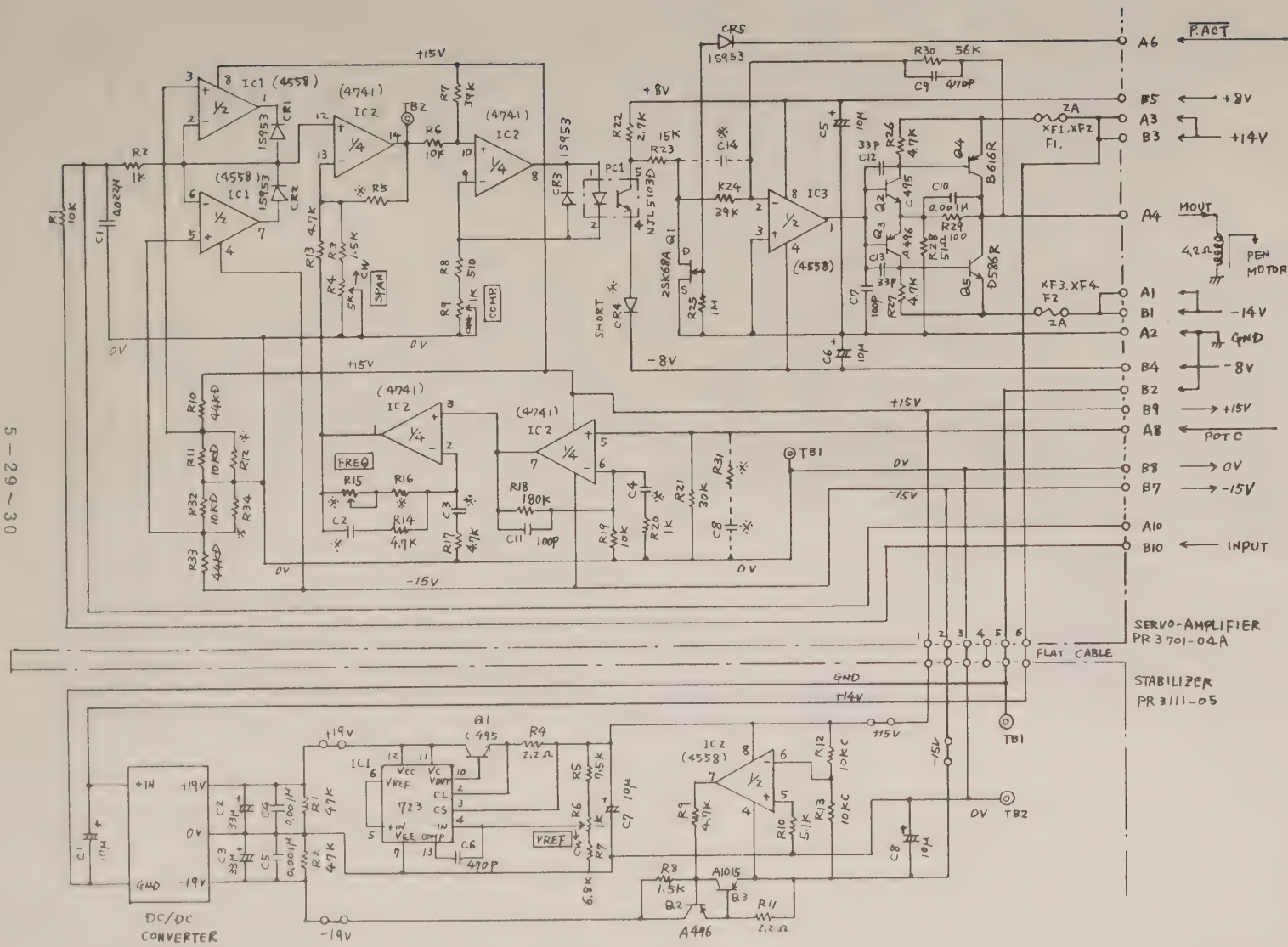
Heat Control Unit

Figure	Part No.	Description	Type	Remarks
IC1, 3	A603300054	IC, Op-Amp Dual	UPC4558C	
IC4	J 603303826	" , Hybrid-IC	WS-2120	
IC5, 7	A603300054	" , Op-Amp Dual	UPC4558C	
IC8	J 603303826	" , Hybrid-IC	WS-2120	
PC1, 2	G603300108	Photo Coupler I_F = 70mA I_C = 100mA 60% ≤ CTR ≤ 150% ?	NJL5103D	
Q1	G603203014	T, NPN 100mA 30V 200mW	2SC1815,Y	
Q2	A603203047	" 3A 60V 30W	2SD880	
Q3	G603203014	NPN 100mA 30V 200mW	2SC1815,Y	
Q4	A603203047	", " 3A 60V 30W	2SD880	
CR2, 3	G603100020	Di, Si V_R = 30V I_F = 0.1A	IS953	
CR5, 6	G603100020	Di, Si V_R = 30V I_F = 0.1A	IS953	
R1	A504207056	R, Variable, Carbon 10K	EVUF1A503B14	
R2	G505102027	", Trimmer 20K	GF06P-20K	
R4	G501810410	Metal Film 10K 1/4W ±1%	RN1/4-10KF	
R7	G501810418	18K	RN1/4-18KF	
R8	G501810375	7.5K	RN1/4-7.5KF	
R9, 10	G501810420	20K	RN1/4-20KF	
R11, 12	G501810336	3.6K	RN1/4-3.6KF	
R13	G501810310	1K	RN1/4-1KF	
R14	G501810343	4.3K	RN1/4-4.3KF	
R15	B503400005	Thermister 10K	10KD7-15%	
R16	G501810320	Metal Film 2K 1/4W ±1%	RN1/4-2KF	
R17	G501810418	18K	RN1/4-18KF	
R18	G501810318	1.8K	RN1/4-1.8KF	
R19	G501810315	1.5K	RN1/4-1.5KF	
R20	G501810410	10K	RN1/4-10KF	
R21	G501810310	1K	RN1/4-1KF	
R22	G501810247	470Ω	RN1/4-470F	
R23	G501810410	10K	RN1/4-10KF	
R24	G501810520	200K	RN1/4-200KF	
R25	G501810343	4.3K	RN1/4-4.3KF	
R26	G505102036	Trimmer 1K	GF06P-1K	
R27, 28	G505102027	20K	GF06P-20K	
R29	G505102036	1K	GF06P-1K	
R30	G501810227	Metal Film 270Ω 1/4W ±1%	RN1/4-270F	
R31	G501810351	5.1K	RN1/4-5.1KF	
R32	G501810322	2.2K	RN1/4-2.2KF	
R34	G501810410	Metal Film 10K 1/4W ±1%	RN1/4-10KF	

Heat Control Unit

Figure	Part No.	Description				Type	Remarks
R10	G501810491	Metal Film	91K	1/4W	±1%	RN1/4-91KF	
R11	G501810510		100K			RN1/4-100K	
R12	G501810310		1K			RN1/4-1KF	
R13	G501804701		16Ω	1/2W	±5%	RNE1/2-15J	
R14	A504207056	Variable Carbon	10K			EVUR0AS20B14	
R42	G505102027	Trimmer	20K			GF06P-20K	
R44	G501810410	Metal Film	10K	1/4W	±1%	RN1/4-10KF	
R47	G501810418	Metal Film	18K	1/4W	±1%	RN1/4-18KF	
R48	G501810375		7.5K			RN1/4-7.5KF	
R49,50	G501810420		20K			RN1/4-20KF	
R51,52	G501810336		3.6K			RN1/4-3.6KF	
R53	G501810310		1K			RN1/4-1KF	
R54	G501810343		4.3K			RN1/4-4.3KF	
R56	B503400005	Thermister	10K			10KD7-15%	
R58	G501810320	Metal Film	2K	1/4W	±1%	RN1/4-2KF	
R59	G501810418		18K			RN1/4-18KF	
R60	G501810318		1.8K			RN1/4-1.8KF	
R61	G501810315		1.5K			RN1/4-1.5KF	
R62	G501810410		10K			RN1/4-10KF	
R63	G501810310		1K			RN1/4-1KF	
R64	G501810247		470Ω			RN1/4-470F	For GS7501
R65	G501810310		1K			RN1/4-1KF	For GW7501
R66	G501810410		10K			RN1/4-10KF	
R67	G501810620		200K			RN1/4-200KF	
R68	G501810343		4.3K			RN1/4-4.3KF	
R86	G505102036	Trimmer	1K			GF06P-1K	
R87,88	G505102027		20K			GF06P-20K	
R89	G505102036		1K			GF06P-1K	For GS7501
R89	A505102026		2K			GF6P-2K	For GW7501
R70	G501810227	Metal Film	270Ω	1/4W	±1%	RN1/4-270F	
R71	G501810051		5.1K			RN1/4-5.1KF	
R72	G501810022		2.2K			RN1/4-2.2KF	
R73	G501810410	Metal Film	10K	1/4W	±1%	RN1/4-10KF	
R74	G501810491		91K			RN1/4-91KF	
R75	G501810121		120K			RN1/4-120KF	
R77	G501810010		1K			RN1/4-1KF	
R78	G501804701		16Ω	1/2W	±5%	RNE1/2-15J	
R80	G501810100		10Ω	1/4W	±1%	RN1/4-10F	
R81,82							
C1,2	G502208024	Tantalum	1.5μ	25WV		CS15E1D1R5M	
C3,4	A502102032	Electrolytic	47μ	25WV		ECEA1AES470	
C5,6	G502208024	Tantalum	1.5μ	25WV		CS15E1D1R5M	
C7,8	A502102032	Electrolytic	47μ	25WV		ECEA1AES470	

Figure	Part No.	Description	Type	Remark
	B520100012	Insulating Sheet	30B6001	For Q2, 4
S1, 2	G508201018	Switch, Push	2UEE	
CAP	B516100020	Cap, Black	B911	For S1, S2
TB1~6	G513400027	Test Terminal	LC-1-G	
TB7~10				
PCB		Printed Circuit Board	PR3500-05	



SERVO-AMP

	GS7501	GW7501
R5	30K	22K
R12,14	OPEN	330K
R16	15K	30K
R15	20K	50K
R31	OPEN	OPEN
C2	0.001μ	0.022μ
C3	0.047μ	0.033μ
C4	0.047μ	0.22μ
C14	OPEN	OPEN
CR4	SHORT	SHORT

CARD EDGE CONNECTOR

SIGNAL	NO.		SIGNAL
-14V	A1	B1	-14V
GND	A2	B2	GND
+14V	A3	B3	+14V
MOUT	A4	B4	-8V
	A5	B5	+8V
P.ACT	A6	B6	
	A7	B7	-15V
POTC	A8	B8	0V
	A9	B9	+15V
	A10	B10	INPUT

Servo Amplifier (GS7501)

Figure	Part No.	Description	Type	Remarks
IC1	A503300054	IC, Op-Amp Dual	NJM4558D	
IC2	A503300034	" , Op-Amp Quadruple	UPC4741C	
IC3	A503300054	" , Op-Amp Dual	NJM4558D	
PC1	G503300108	Photo Coupler I_F = 70mA I_C = 100mA 60% ≤ CTR ≤ 150%	NJL5103D	
Q1	G503203015	T, N-J-FET	2SK68A	
Q2	G503200011	", NPN 50V 1A 1W	2SC495.0	
Q3	G503200003	", PNP −50V −1A 1W	2SA496,Y	
Q4	G503200018	", PNP −80V −5A 60W	2SB616,R	
Q5	G503200021	", NPN 80V 5A 60W	2SD586,R	
CR1~3	G503200020	Di, Si V_R = 30V I_F = 0.1A	1S953	
CR5	"	" , " " "	"	
R1	G501810410	R, Metal Film 10K 1/4W ±1%	RN1/4-10KF	
R2	G501810310	" , " 1K " "	RN1/4-1KF	
R3	G501810315	" , " 1.5K " "	RN1/4-1.5KF	
R4	G504207048	" , Trimmer 5K	TM10KPH-5K	
R5	G501810430	" , Metal Film 30K 1/4W ±1%	RN1/4-30KF	
R6	G501810410	" , " 10K " "	RN1/4-10KF	
R7	G501810439	" , " 39K " "	RN1/4-39KF	
R8	G501810251	" , " 510Ω " "	RN1/4-510F	
R9	G504207049	" , Trimmer 1K	TM10KPH-1K	
R10	A501303444	" , Metal Film 44K 1/4W ±0.5%	RNE1/4-44KD	
R11	G501303408	" , " 10K " "	RNE1/4-10KD	
R13, 14	G501810347	" , " 4.7K " ±1%	RN1/4-4.7KF	
R15	G504207031	" , Trimmer 20K	TM10KPH-20K	
R16	G501810415	" , Metal Film 15K 1/4W ±1%	RN1/4-15KF	
R17	G501810347	" , " 4.7K " "	RN1/4-4.7KF	
R18	G501810518	" , " 180K " "	RN1/4-180KF	
R19	G501810410	" , " 10K " "	RN1/4-10KF	
R20	G501810310	" , " 1K " "	RN1/4-1KF	
R21	G501810430	" , " 30K " "	RN1/4-30KF	
R22	G501810327	" , " 2.7K " "	RN1/4-2.7KF	
R23	G501810415	" , " 15K " "	RN1/4-15KF	
R24	G501810439	" , " 39K " "	RN1/4-39KF	
R25	G501810610	" , " 1M " "	RN1/4-1MF	
R26, 27	G501810347	" , " 4.7K " "	RN1/4-4.7KF	
R29	G501810210	" , " 100Ω " "	RN1/4-100F	
R30	G501810475	" , " 75K " "	RN1/4-75KF	
R31				
R32	G501303408	", Metal Film 10K 1/4W ±0.5%	RNE1/4-10KD	
R33	A501303444	", " 44K " "	RNE1/4-44KD	

Figure	Part No.	Description				Type	Remarks
R29	[illegible]	R Metal Film	6.1K	1/4W	±1%	RN1/4-6K1F	
C1	[illegible]	C Mylar Film	0.022μ	50WV		MFL-0S522	
C2	[illegible]	"	0.01μ	"		MFL-0S01	
C3	[illegible]	"	0.047μ	"		MFL-0S647	
C4							
C5	[illegible]	C Electrolytic	10μ	25WV		SME25VB10	
C6							
C7	[illegible]	C Ceramic	100P	50WV		CFDC4-101K4-D	
C8							
C9	[illegible]	C Ceramic	470P	50WV		CSDW4-S-L-471	
C10	[illegible]	C Mylar Film	0.001μ	"		MFL-0S01	
C11	[illegible]	C Ceramic	100P	"		CFDC4-101K4-D	
C12	[illegible]	"	33P	"		RPE-U4S-L330A-L05A-E	
C13							
F1	[illegible]	Fuse	2A			T1A1-0A	
F2							
*F1	[illegible]	Fuse Holder				3AT31-1A-B	
*F2							
*F3							
*F4							
FC	[illegible]	Flat Cable				AWM-1-80-8P-154	
TB	[illegible]	Test Terminal				LG-1-E	
TB2							
PCB	[illegible]	Printed Circuit Board				BTU-0A4	
	[illegible]	Insulating Washer				B-18	For Q4 For Q5

Servo Amplifier (GW7501)

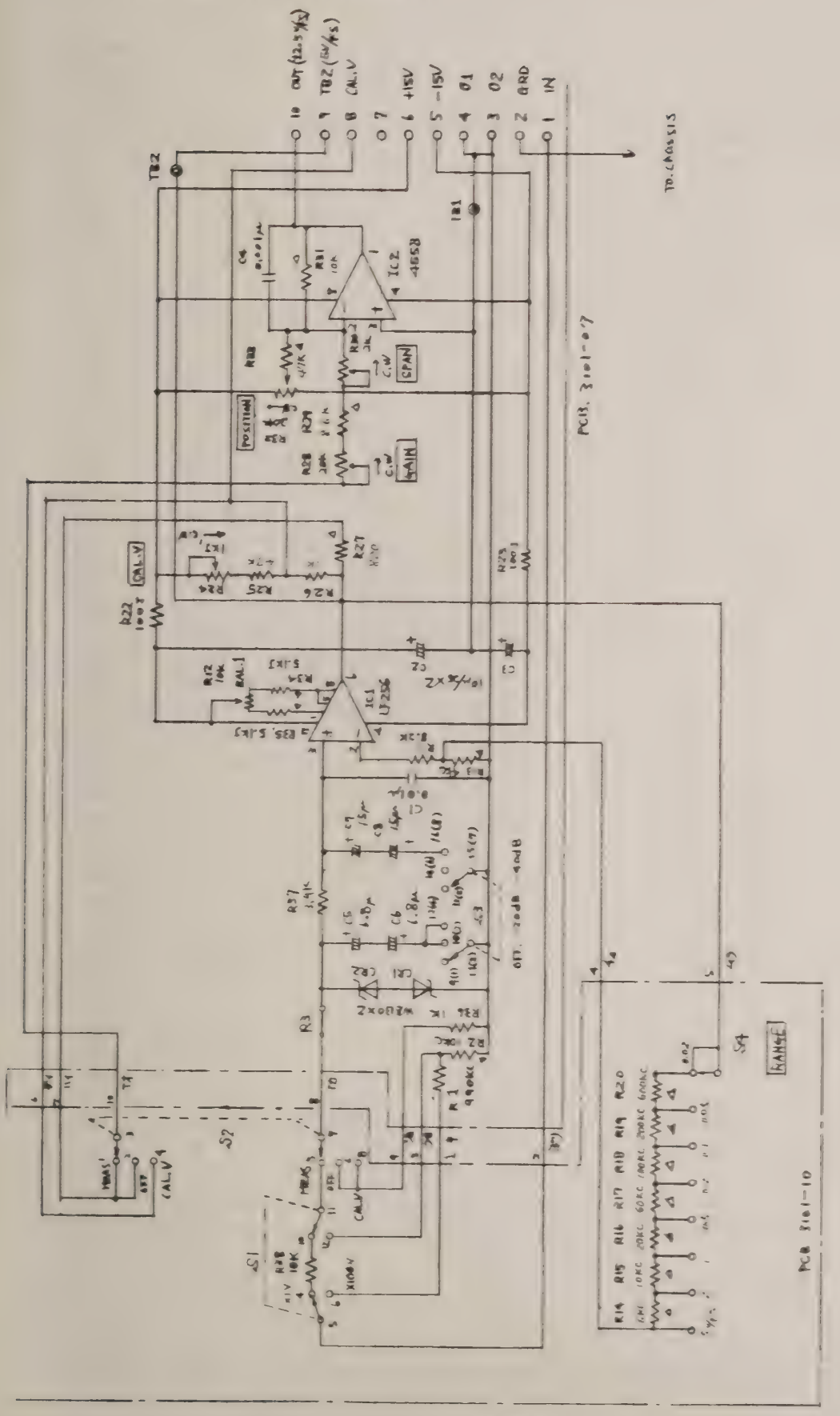
Figure	Part No.	Description	Type	Remarks
IC1	A503300054	IC, Op-Amp Dual	NJM4558D	
IC2	A503300084	Op-Amp Quadruple	μPC4741C	
IC3	A503300054	Op-Amp Dual	NJM4558D	
PC1	G503300108	Photo Coupler I_F = 70mA I_C = 100mA 50% ≤ CTR ≤ 150%	TLP521GB	
Q1	G503203015	T, N-J-FET	2SK68A	
Q2	G503200011	", NPN 50V 1A 1W	2SC496 O	
Q3	G503200003	" PNP −50V −1A 1W	2SA498 Y	
Q4	G503200018	" PNP −80V −5A 80W	2SB618 P	
Q5	G503200021	" NPN 80V 5A 80W	2SD588 P	
CR1~3	G503200020	Di, Si V_R = 30V I_F = 0.1A	1S953	
CR5		" "		
R1	G501810410	R, Metal Film 10K 1/4W ±1%	RN1/4-10KF	
R2	G501810310	" " 1K " "	RN1/4-1KF	
R3	G501810315	" " 1.5K " "	RN1/4-1.5KF	
R4	G504207048	" Trimmer 5K	TM10KP-5K	
R5	G501810422	" Metal Film 22K 1/4W ±1%	RN1/4-22KF	
R6	G501810410	" " 10K " "	RN1/4-10KF	
R7	G501810439	" " 39K " "	RN1/4-39KF	
R8	G501810251	" " 510Ω " "	RN1/4-510F	
R9	G504207049	" Trimmer 1K	TM10KP-1K	
R10	A501303444	" Metal Film 44K 1/4W ±0.5%	RNE1/4-44KD	
R11	G501303408	" " 10K " "	RNE1/4-10KD	
R12	G501810533	" " 330K " ±1%	RN1/4-330KF	
R13, 14	G501810347	" " 47K " "	RN1/4-47KF	
R15	G504207061	" Trimmer 50K	TM10KP-50K	
R16	G501810430	" Metal Film 30K 1/4W ±1%	RN1/4-30KF	
R17	G501810347	" " 47K " "	RN1/4-47KF	
R18	G501810518	" " 180K " "	RN1/4-180KF	
R19	G501810410	" " 10K " "	RN1/4-10KF	
R20	G501810310	" " 1K " "	RN1/4-1KF	
R21	G501810430	" " 30K " "	RN1/4-30KF	
R22	G501810327	" " 2.7K " "	RN1/4-2.7KF	
R23	G501810415	" " 1.5K " "	RN1/4-1.5KF	
R24	G501810439	" " 39K " "	RN1/4-39KF	
R25	G501810610	" " 1M " "	RN1/4-1MF	
R26, 27	G501810347	" " 47K " "	RN1/4-47KF	
R29	G501810210	" " 100Ω " "	RN1/4-100F	
R30	G501810475	" " 7.5K " "	RN1/4-7.5KF	
R31				
R32	G501303408	" Metal Film 10K 1/4W ±0.5%	RNE1/4-10KD	

Figure	Part No.	Description				Type	Remarks
R33	A501303444	R, Metal Film	44K	1/4W	±0.5%	RNE1/4-44KD	
R34	G501810533	" , "	330K	"	±1%	RN1/4-330KF	
R28	G501810451	" , "	51K	"	"	RN1/4-51KF	
C1	G502303008	C, Myler Film	0.022μ	50WV		MFL-05S22	
C2	"	" , "	"	"			
C3	G502303009	" , "	0.033μ	"		MFL-05S33	
C4	G502503005	" , "	0.22μ	100WV		EML0.22-100	
C5	G502103023	" , Electrolytic	10μ	25WV		SM25VB-10	
C6	"	" , "	"	"		"	
C7	G502403009	" , Ceramic	100P	50WV		UFD04-101K-K2J	
C8							
C9	G502403003	C, Ceramic	470P	50WV		USD04-SL-471	
C10	G502303002	" , Myler Film	0.001μ	"		MFL-05D1	
C11	G502403009	" , Ceramic	100P	"		UFD04-101K-K2J	
C12	G502403034	" , "	33P	"		RAU04SL330KL05AE	
C13	"	" , "	"	"		"	
F1	G512300011	Fuse	2A			7142-2A	
F2	"	"	"			"	
XF1	A512400008	Fuse Holder				0G751-0056	
XF2	"	"				"	
XF3	"	"				"	
XF4	"	"				"	
FPC	B520110061	Flat Cable				JVU6-,1-35-3P254	
TB1	B513400027	Test Terminal				LC-1-G	
TB2	"	"				"	
PCB	A511370040	Printed Circuit Board				3701-04A	
	B520100030	Insulating Washer				B-18	
	"	"				"	

Stabilizer

Figure	Part No.	Description				Type	Remarks
IC1	A503300117	IC, Voltage Regulator				HA17723G	
IC2	G503300054	" , Op-Amp Dual				μPC4558C	
Q1	G503200011	Tr, NPN	50V	1A	1W	2SC495	
Q2	G503200003	" , PNP	−50V	−1A	1W	2SA496	
Q3	G503203016	" , "	−30V	−100mA	0.2W	2SA1015	
R1	G501810447	R, Metal Film	47K	1/4W	±1%	RN1/4-47KF	
R2	"	" , "	"	"	"	"	
R4	G501203701	" , Solid	2.2Ω	"	±5%	RC1/4-2.2J	
R5	G501810375	" , Metal Film	7.5K	"	±1%	RN1/4-75.KF	
R6	G504207022	" , Variable	2K			TM10KPH-2K	For Stb
R7	G501810368	" , Metal Film	6.8K	1/4W	±1%	RN1/4-6.8KF	
R8	G501810315	" , "	1.5K	"	"	RN1/4-1.5KF	
R9	G501810347	" , "	4.7K	"	"	RN1/4-4.7KF	
R10	G501810351	" , "	5.1K	"	"	RN164-5.1KF	
R11	G501203701	" , Solid	2.2Ω	"	±5%	RC1/4-2.2J	
R12	G501303307	" , Metal Film	10K	"	±0.25%	RNE1/4-10KC	
R13	"	" , "	"	"	"	"	
C1	G502103023	C, Electrolytic	10μ	25WV		SM25VB-10	
C2	G502103011	" , "	33μ	"		SL25VB-33	
C3	"	" , "	"	"		"	
C4	G502403007	" , Ceramic	0.01μ	50WV		ULD06-103-L2A	
C5	"	" , "	"	"		"	
C6	G502403003	" , "	470P	"		USD04-SL-471K	
C7	G502103023	" , Electrolytic	10μ	25WV		SM25VB-10	
C8	"	" , "	"	"		"	
DC/DC	A518100007	DC/DC Converter				GE0322A	
TB1	B513400027	Test Terminal				LC-1-G	
PCB	A511311150	P.C.B.				PR3111-05	

5-7 PRE AMPLIFIER(AL3501)



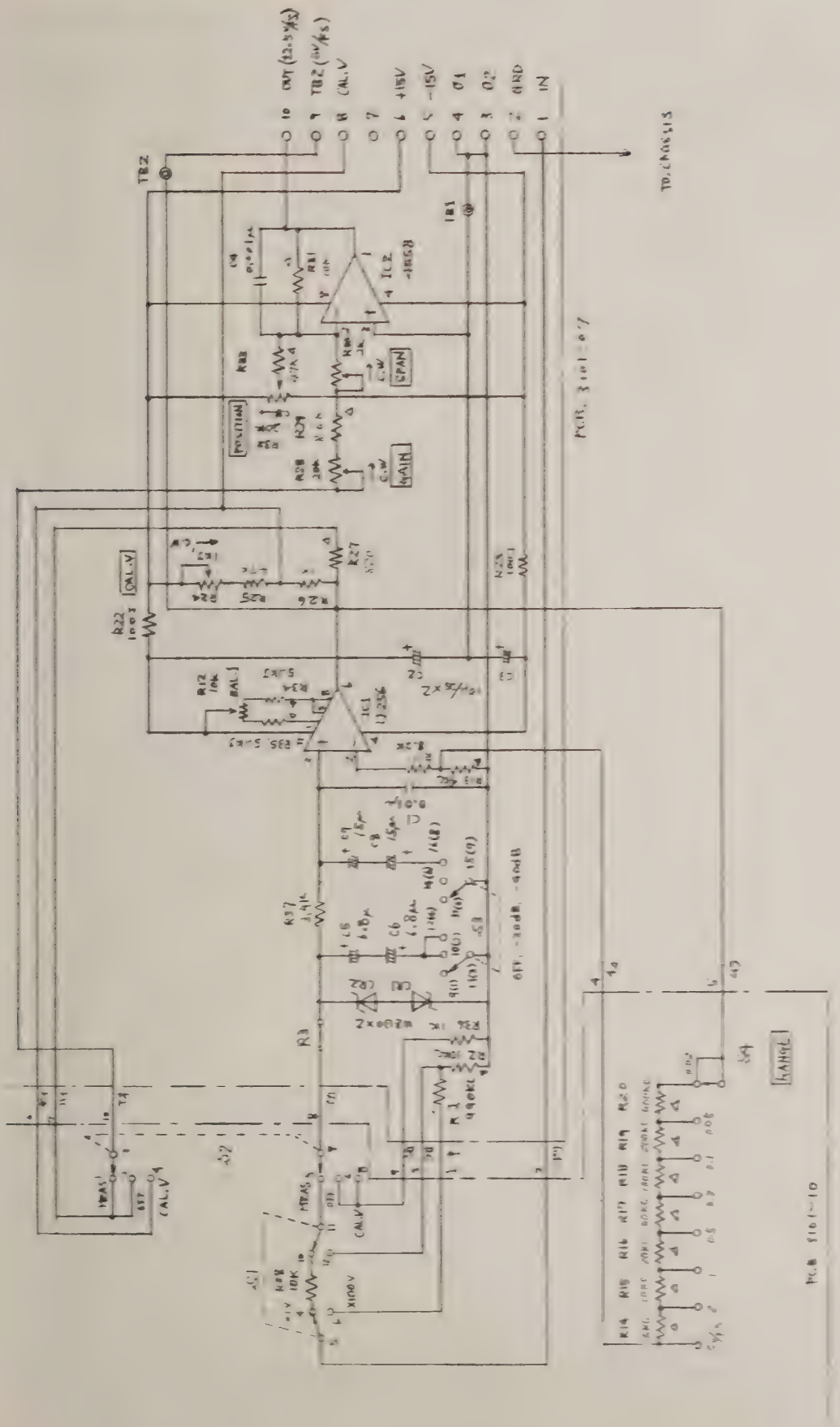
Note 1) MARK "." : 25 P.P.M/°C
MARK "0" : 100 P.P.M/°C
2) TRIMER R30 have been set 3KΩ ohms.
3) RANGE OF AL : "( )"
4) R9 : SHORT

Pre Amplifier (AL3501)

Figure	Part No.	Description				Type	Remarks
IC1	A503300130	IC, Op-Amp				TDE0156CM	
IC2	A503300054	" , Op-Amp Dual				μPC4558C	
CR1	G503100005	Di, Zenner	13V	0.5W	±5%	RD13EB2	
CR2	"	" , "	"	"	"	"	
R1	G501503301	R, Metal Film	990K	1/2W	±0.25%	RN65E990KC	
R2	G501303307	" , "	10K	1/4W	"	RNE1/4-10KC	
R11	G501810382	" , "	8.2K	"	±1%	RN1/4-8.2KF	
R12	G504207021	" , Variable Carbon	10K			RVTM10KPH-10K	
R13	G501303308	" , Metal Film	4K	1/4W	±0.25%	RNE1/4-4KC	
R14	A501303318	" , "	6K	"	"	RNE1/4-6KC	
R15	G501303307	" , "	10K	"	"	RNE1/4-10KC	
R16	G501303310	" , "	20K	"	"	RNE1/4-20KC	
R17	A501303319	" , "	60K	"	"	RNE1/4-60KC	
R18	A501303320	" , "	100K	"	"	RNE1/4-100KC	
R19	G501303313	" , "	200K	"	"	RNE1/4-200KC	
R20	"	" , "	600K	"	"	RNE1/4-600KC	
R22	G501810210	" , "	100	"	±1%	RN1/4-100F	
R23	"	" , "	"	"	"	"	
R24	G504207049	" , Variable Carbon	1K			RVTM10KPH-1K	
R25	G501810347	" , Metal Film	4.7K	1/4W	±1%	RN1/4-4.7KF	
R26	G501810310	" , "	1K	"	"	RN1/4-1KF	
R27	G501810282	" , "	270	"	"	RN1/4-270F	
R28	A504103015	" , Variable Carbon	20K			RV16YP20SB20K	
R29	A501810386	" , Metal Film	8.6K	1/4W	±1%	RN1/4-8.6KF	
R30	G504207022	" , Variable Carbon	2K			RVTM10RPH-2K	
R31	G501810410	" , Metal Film	10K	1/4W	±1%	RN1/4-10KF	
R32	A504103015	" , Variable Carbon	20K			RV16YP20SB20K	
R33	G501810447	" , Metal Film	47K	1/4W	±1%	RN1/4-47KF	
R34	G501810351	" , "	5.1K	"	"	RN1/4-5.1KF	
R35	"	" , "	"	"	"	"	
R36	G501810310	" , "	1K	"	"	RN1/4-1KF	
R37	G501810339	" , "	3.9K	"	"	RN1/4-3.9KF	
R38	G501810410	" , "	10K	"	"	RN1/4-10KF	
C1	G502303004	C, Myler Film	0.01μ	50WV		MFL-05S1	
C2	A502901007	" , Electrolytic	10μ	25WV		ECEA1ES100	
C3	"	" , "	"	"		"	
C4	G502303002	" , Myler Film	0.001μ	50WV		MFL-05D1	
C5	G502204001	" , Tantalum	6.8μ	16WV		CS15E1C6R8MIS-A	
C6	"	" , "	"	"		"	
C7	G502204005	" , "	15μ	"		CS15E1C150MIS-A	
C8	"	" , "	"	"		"	

Figure	Part No.	Description	Type	Remarks
1	B60430404008	Switch Slide	SSA042L12	
32	B60830404001		SSA043L12	
33	B60830404003		SSA043L06	
34	A5071C1127	Switch Rotary	SRM2018A15R-F	
	B6161000016	Knob φ10mm Black	021-222	POSITION
	B0671177410	Spacer		
	B6161000015	Cap φ10mm Black	040-160	
	A6161000028	Knob φ14.5mm, Black with Line	013-842	POSITION
	A6161000029	Cap φ14.5mm, Black with Line	040-862	
	A6161000030	Nut Cover	044-302	
TB1 TB2	B6134000027	Test Terminal	LC-113	
P18	A6113110220	Printed Circuit Board	PR3101407B	
	A6113110301		PR3101408B	

5-8 PRE AMPLIFIER(AH3501)



Pre Amplifier (AH3501)

Figure	Part No.	Description				Type	Remarks
IC1	A503301165	IC, Op-Amp				OP-05-C	
IC2	G50330054	" ,				UPC4558C	
CR1	G503100035	Di, Zener	6.5V	0.5W	±5%	RD6.8EB2	
CR2	"	" , "	"	"	"	"	
CR3	G503100007	" , "	8.1V	"	"	RD8.2EB3	
CR4	"	" , "	"	"	"	"	
R1	G501503302	R, Metal Film	999K	1/2W	±0.25%	RN65E999KC	
R2	G501303301	" , "	1K	1/4W	"	RNE1/4-1KC	
R3	G501810362	" , "	6.2K	"	±1%	RN1/4-6.2KF	
R4	G501810151	" , "	51	"	"	RN1/4-51F	
R5	"	" , "	"	"	"	"	
R6	G504207021	" , Variable Carbon	10K			RVTM10KPH-10K	
R7	G501810510	" , Metal Film	100K	1/4W	±1%	RN1/4-100KF	
R8	"	" , "	"	"	"	"	
R9	G501810610	" , "	1M	"	"	RN1/4-1MF	
R10	"	" , "	1M	"	"	"	
R11	G501810412	" , "	12K	"	"	RN1/4-12KF	
R12	G504207021	" , Variable Carbon	10K			RVTM10KPH-10K	
R13	G501303301	" , Meral Film	1K	1/4W	±0.25%	RNE1/4-1KC	
R14	"	" , "	"	"	"	"	
R15	G501303317	" , "	2K	"	"	RNE1/4-2KC	
R16	A501303318	" , "	6K	"	"	RNE1/4-6KC	
R17	G501303307	" , "	10K	"	"	RNE1/4-10KC	
R18	G501303310	" , "	20K	"	"	RNE1/4-20KC	
R19	A501303319	" , "	60K	"	"	RNE1/4-60KC	
R20	A501303320	" , "	100K	"	"	RNE1/4-100KC	
R21	G501303313	" , "	200K	"	"	RNE1/4-200KC	
R22	G501810315	" , "	1.5K	"	±1%	RN1/4-1.5KF	
R23	"	" , "	"	"	"	"	
R24	G504207049	" , Variable Carbon	1K			RVTM10KPH-1K	
R25	G501810368	" , Metal Film	6.8K	1/4W	±1%	RN1/4-6.8KF	
R26	G501810251	" , "	510	"	"	RN1/4-510F	
R27	G501810247	" , "	470	"	"	RN1/4-470F	
R28	A504103015	" , Variable Carbon	20K			RV16YP20SB20K	
R29	G501810382	" , Metal Film	8.2K	1/4W	±1%	RN1/4-8.2KF	
R30	G504207022	" , Variable Carbon	2K			RVTM10KPH-2K	
R31	G501810424	" , Metal Film	24K	1/4W	±1%	RN1/4-24KF	
R32	A504103015	" , Variable Carbon	20K			RV16YP20SB20K	
R33	G501810511	" , Metal Film	110K	1/4W	±1%	RN1/4-110KF	
R34	G501810351	" , "	5.1K	"	"	RN1/4-5.1KF	
R35	"	" , "	"	"	"	"	
R36	G501810310	" , "	1K	"	"	RN1/4-1KF	
R37	G501810362	" , "	6.2K	"	"	RN1/4-6.2KF	

Figure	Part No.	Description	Type	Remarks
C1	G502303004	C, Myler Film 0.01μ 50WV	MFL-05S1	
C2	A502102028	", Electrolytic 10μ 25WV	ECEA1ES100	
C3	"	" " " "	"	
C4	G502303002	", Myler Film 0.001μ 50WV	MFL-05D1	
C5	G502204004	", Tantalum 10μ 16WV	CS15E1C100MIS-A	
C6	"	" " " "	"	
C7	"	" " " "	"	
C8	"	" " " "	"	
S1	G508304008	Switch, Slide	SSA042L12	
S2	G508304002	" "	SSA043L12	
S3	G508304003	" "	SSA043L06	
S4	A507101108	Switch, Rotary	SRM1019-15R-P	
	B516100016	Knob, φ10mm Black	021-222	POSITION
	B516100018	Cap, φ10mm Black	040-162	"
	B067117110	Spacer	Knob, Spacer 0000	
	A516100028	Knob, φ14.5mm, Black with Line	023-342	RANGE
	A516100029	Cap, φ14.5mm, Black with Line	040-362	
	A516100030	Nut Cover	044-322	
TB1	B513400027	Test Terminal	LC-1-G	
TB2	"	"	"	
PCB	A511310220	Printed Circuit Board	PR3101-07B	
PCB	A511310301	"	PR3101-10B	

6. SPECIFICATIONS

6.1 Mainframe Specifications

No. of channels	1	2
Pen motor	GW7501	GS7501
Recording width	±40mm	±20mm
Chart paper feed speed	1, 2.5, 5, 10, 25, 50, 100mm/s & min and external sync	
Feed accuracy	±1.5% ±0.5mm	
Chart paper	Roll (length: 40m)	
Recording method	Thermal	
Input type	Floating ground	
Input resistance	Potentiometric	
Input sensitivity	±2.5V/FS	
Accuracy	±0.7% (including linearity and deadband)	
Frequency characteristics	20mm p-p: 0 ∿ 30Hz 40mm p-p: 0 ∿ 25Hz 80mm p-p: 0 ∿ 20Hz +5%/-10%	10mm p-p: 0 ∿ 70Hz 20mm p-p: 0 ∿ 50Hz 40mm p-p: 0 ∿ 35Hz +5%/-10%
Time marker	STOP, 1s, 10s, 1min, 10min (switchable with the event marker)	
Event marker	Pushbutton or remote control (contact input or TTL-level signal) (Switchable with time marker)	
Chart paper feed stop	Pushbutton or remote control (contact input or TTL-level signal)	
External chart feed speed synchronization	Pitch: 0.025mm/pulse Frequency: 0 ∿ 4000pps (0 ∿ 100mm/s)	

Pen heat on/off	Pushbutton or remote control (contact input or TTL-level signal)	
Power requirements	100VAC (specifiable as 115/200/220/240VAC also), ±10%, 50/60Hz 12VDC (10.5 ∿ 15V)	
Power consumption	Ave.: 46VA, max.: 83VA	Ave.: 50VA, max.: 130VA
External dimensions (±3mm tolerance)	205(W) x 254(D) x 266(H)	
Weight	6.2kg	6.9kg
Operating environment	0 ∿ 45°C, 30 ∿ 80% RH	

6.2 Preamplifier Specifications

input type	Floating with guard
input resistance	1MΩ, fixed (allowable signal source resistance: 10kΩ or less)
Max. input voltage	500VDC (including common-mode voltage)
Measurement range (AL3501)	0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5V/FS 2, 5, 10, 20, 50, 100, 200 V/FS
Switching accuracy	±1%
Measurement range (AH3501)	5, 10, 20, 50, 100, 200, 500, 1000, 2000mV/FS 5, 10, 20, 50, 100, 200 V/FS
Switching accuracy	±1%
Sensitivity adjustment	Continuous between ranges
Position adjustment	Anywhere in the full scale range
Calibration voltage	x2 the range setting
Common-mode rejection ratio	DC: 130dB, AC: 110dB (AL3501) DC: 140dB, AC: 120dB (AH3501)
input filtering (at 50Hz)	-40dB/-20dB/OFF

6.3 Options

Name	Model	Description
Additional event marker	B202	Mounted on the right side of the panel (as seen from front) and includes remote ON/OFF control (contacts or TTL level signal).
Printing function	B203	Information printed: Year, month, day, hour, minute, second and chart speed. In the normal mode, the time from power ON is accumulated. In the real mode, the time from a time setting is accumulated. External printing: ASCII Codes are printed (Centronics compatible)
Battery	B204	Operating time: Approx. 3hr (10Hz, 40mmp-p signal) Charging time: 20hr
Carrying case	B205	235 x 310 x 390mm
Rack mount fixtures	B206 B207	DIN Standard EIA (inch) Standard
Z-Fold paper box	B208	Holds Z-fold paper (150mm fold width and 150m long)
Front panel input	B209	Input at a round connector on the front panel.
Metal cover with transparent panel	B210	Enables viewing of the recording surface.

* The additional event marker and printing function may not be installed on the same recorder.

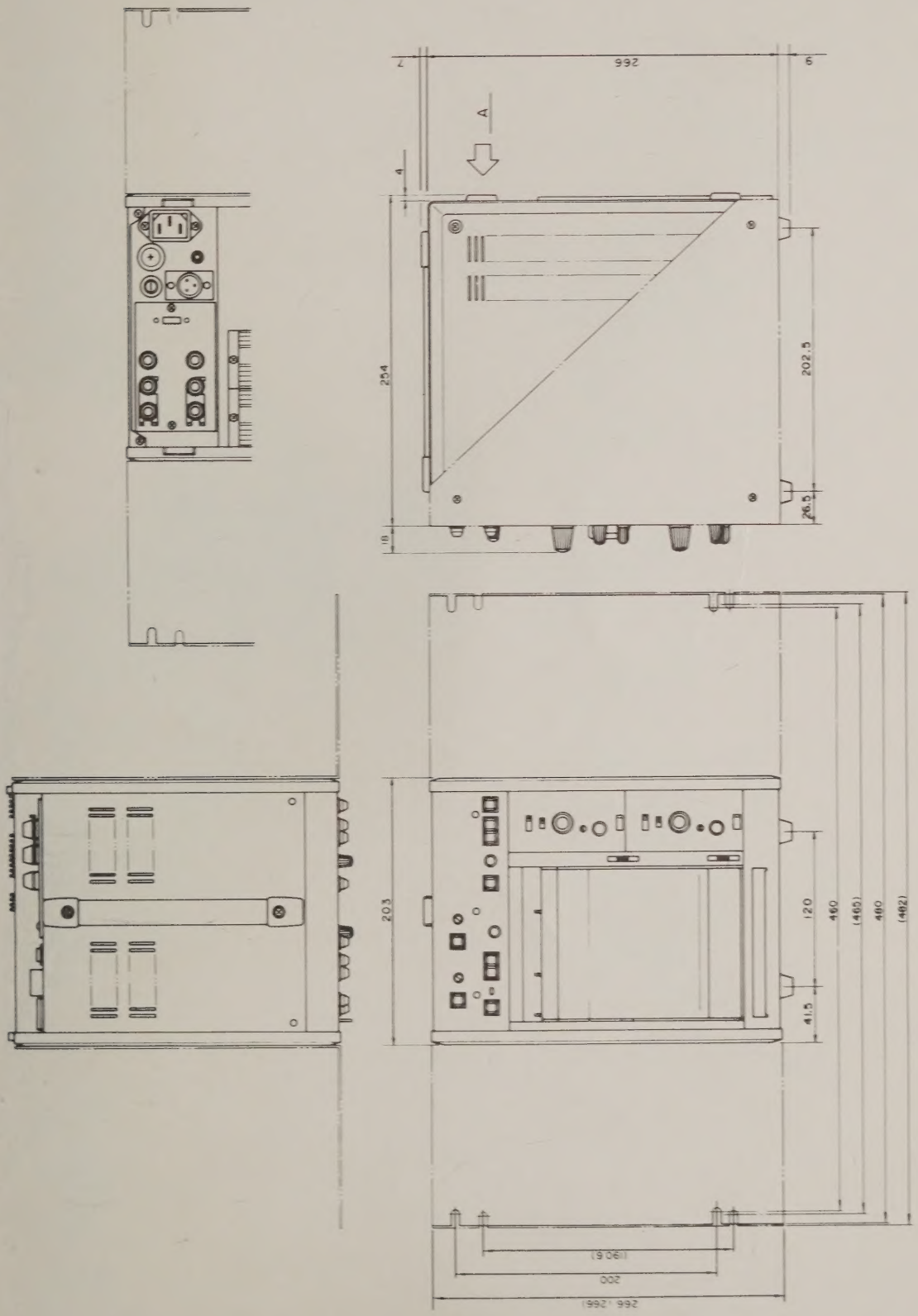
6.4 Accessories

Name	Qty.
Instruction manual	1
Power cable (DC)	1
Power cable (AC)	1
Input cables	2 (or 1)
Fuses (15A)	2
Fuses (2A or 4A)	2
Recording paper (roll)	1 roll (40m)
Remote connector	1

6.5 Supplies

Name	Model	Description
Recording paper	PR-220	40mm wide (50div) roll paper (40m long)
	PR-221	80mm wide (100div) roll paper (40m long)
	PZ-220	40mm wide (50div) Z-fold paper (150m long)
	PZ-221	80mm wide (100div) Z-fold paper (150m long)
Recording pens	KT-201	Recording pen for 40mm width
	KT-202	Recording pen for 80mm width
Fine-line recording pens (0.15mm recording)	KT-204	Recording pen for 40mm width
	KT-205	Recording pen for 80mm width
Marker pen	KT-213	For event/time markers
Additional marker pen	KT-214	For additional event marker

7. OUTER DIMENSIONS



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Printed in Japan